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of the

Luzerne County Medical Society,

for the

Year ending December 31,

1897.

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TRANSACTIONS

OF THE

Luzerne County Medical Society,

FOR THE

Year Ending December 31, 1897.

ORGANIZED MARCH, 1861.

WILKES-BARRE, PA.:
E. B. YORDY, PRINTING AND BLANK BOOKS.
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ADDRESS OF THE RETIRING PRESIDENT,

DR. CHARLES LONG, WILKES-BARRE, PA.

READ BEFORE THE LUZERNE COUNTY MEDICAL SOCIETY,
JANUARY 13, 1897.

THE HYGIENE OF THE JEWS.

Now that my term of service as president of this society is about ending, I would consider myself ungrateful did I not express my appreciation of the honor which has been conferred upon me, and I consider it such, and my thanks to the members of the Luzerne County Medical Society for their earnest work and attendance during the past year. I take it as an expression of confidence and recognition of work well done, by the best judges of all, our colleagues, and as such I esteem it; a beautiful tribute when we consider the ingratitude of those for whom we most ardently labor.

Nor do I wish to begin my regular address without paying a deserved tribute to the two soldiers, Dr. Murphy and Dr. Underwood, who have fallen by the wayside. Ours was the loss and it is for us to mourn, and I ask you all to rise and to drink in silence, this last toast to them: Dr. Joseph A. Murphy, Dr. Gideon Underwood—may their souls forever rest in peace.

The most renowned physician of the future will not be he who performs the most wonderful cures, but the one who is best able to prevent disease. The tendency of the day would lead us to believe that the treatment of the future will be a prophylactic one, that we shall begin to treat patients by treating their ancestors and teaching them how to live; and this subject of *hygiene* will soon overshadow all others in medicine. It was Huxley, I believe, who said that the time would come when it would be a disgrace to be sick.

Dr. J. G. Clark, in his address before the nurses of our hospital last year, said: "The first great corner-stone in preventive medicine was laid by Jenner one century ago, May 14th, 1796, when he discovered that vaccination of a well individual with

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cow-pox would prevent the disease small-pox." Now, I claim that the first great step in preventive medicine was taken many centuries before this time, and that Moses, the great law-giver, was the first to promulgate any laws pertaining to hygiene. Moses gave to the Hebrew race a law of physical and moral life, and I quote from Deuteronomy, chap. xxx, 19, 20: "I call heaven and earth to record this day against you, that I have set before you life and death, blessing and cursing; therefore choose life that both thou and thy seed may live; that thou mayest love the Lord thy God, and that thou mayest obey his voice, and that thou mayest cleave unto him, for he is thy life and the length of thy days."

It is a well known fact that statistics comparing the length of life of the Jew and his gentile neighbor are decidedly in favor of the former, and this advantage is the direct result of his religion and its rites, and would be even more apparent if the Jew never deviated from the commands of the Thora. If the Jew in certain countries possesses immunity from many of the infectious diseases, as is sometimes claimed, it is due to his rigid observance of his dietary and other hygienic laws. "Judaism has made religion the handmaid of hygiene; it has utilized piety for the preservation of health. The Thora wished to make of Israel a people that should be healthy and holy, *sanus et sanctus*."

I believe that no other religion takes such precautions for the health of its followers; and while it will be impossible for me to discuss all of the hygienic laws of the Jews, you may be interested in some few of them, and that having heard these, you will probably agree with me that the distance between Moses and Pasteur and Koch is not such a great one, scientifically speaking, and that the Laws of the Talmud and the Thora regarding preventive medicine might, with few changes, advantageously be copied by our legislative and scientific bodies of the present day.

* * * * * * * * * * *

Especially strict are the laws pertaining to the ingestion of contaminated meat, and the following are the chief instructions of the Mosaic law regarding meat diet:

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1st. Certain animals are forbidden.

2d. Certain *parts* of the permitted animals are forbidden.

3d. Much depends upon the method by which the animal meets its death as to whether it may be eaten or not.

1st. Only those beasts are permitted to be eaten that are both cloven-footed and chew the cud; all others are called unclean and are forbidden, and special mention is made of the pig and the hare. Of all the animals that live in the water only those which have both fins and scales are permitted. This would exclude the oyster, clam, lobster, crab, etc.

2d. The parts of the animal that the Jew is not permitted to eat are (*a*) the blood; (*b*) those parts that consist entirely of fat.

3d. An animal may meet its death in several ways: (*a*) by the hand of man; (*b*) by means of beast of prey; (*c*) or by injury, sickness or old age. The Mosaic law forbids the Israelite to eat food of an animal that is killed by a beast of prey, and also if it meet its death by an injury, or if it dies of sickness or old age. It calls all such food *terefa*, or unclean, and directs that all animals must be killed by the hand of man; but I am not prepared to say that the Pentateuch teaches the particular method of killing which is the Jewish custom and which makes the meat *koscher*, or clean. This method probably originates with the Rabbis.

The biblical reason given for forbidding the use of blood as a food is that the life of the flesh, the soul, has its seat in the blood, and man should not eat both the meat and its soul. And the fat of those animals used as sacrifices were forbidden.

Man may not eat meat and milk at the same meal. The law says "the kid should not be cooked in the mother milk." The commentators of to-day are inclined to regard this injunction as a precept of humanity; that is, that the mother and her offspring should not be killed upon the same day. Another reason given for not killing the cow or ewe and its young upon the same day, or as long as it is sucking, is, because the meat of the offspring is not fit to be eaten while it is so young; and also that the animal may experience the pleasure of maternity, that of sucking its young. The talmudists interpret this passage as meaning that you shall cook no meat whatsoever in

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milk, and therefore instruct that all mixtures of meat and milk foods are forbidden.

The Jewish method of killing animals is that the greater half of both the gullet and the windpipe must be cut through without a pause, and the incision must be neither too high up nor too low down. It must not be hacked. The knife must be thoroughly clean and free from all nicks. By this method the animal is thoroughly drained of its blood, and the death is comparatively an easy one.

The animal is then thoroughly examined, and if any pathological abnormalities are discovered, such as would have caused the death of the animal within twelve months, it is declared unclean and may not be eaten; and special attention is given to the examination of the lungs and as to whether the lungs are adherent to the ribs. Then, too, before cooking, the housewife must allow the meat to soak in salt water for at least one-half hour, which would certainly drain the arteries of all blood. Even after all this preparation, should the meat come in contact with any unclean thing "it shall not be eaten; it shall be burnt with fire."

While these and various other laws are part of the religion of the Jews, it might well be asked if the law-givers did not use religion to cover simple laws of health so that they would be more rigidly observed. Was Moses not wise in permitting only certain animals as food and forbidding all others? When we consider the warm climate in which the Jews of those days lived, and the rapid decomposition which takes place in fat, in blood and in pork in comparison to the animals and parts of animals allowed by the laws, was the forbidding of these not a good sanitary measure? And who can say that Moses was not cognizant of the trichinæ? It would almost seem so.

Again, he forbade all fish except those that had fins and scales. The lobster, the oyster, etc., were not to be eaten. Would it not be reasonable to suppose that Moses knew that some skin diseases were due to the ingestion of these, and how many of us would risk our digestive organs to the uncertainty of shell fish in the heat of summer; and how much oftener do we hear of ptomaine poisoning being caused by lobsters and crabs than by scale fishes?

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Could the great law-giver live to-day and read some of our learned medical essays on the transmission of disease through the blood, do you not think he would say: "I told you so, and therefore forbade the drinking of blood by my people thirty centuries ago."

Was Moses acquainted with tuberculosis? He certainly forbade the eating of meat taken from an animal that had any pleuritic adhesions; and also where the animal would have died a natural death within twelve months. Could anything be described more distinctly to-day? Then, too, that his people might not fall into any error or take any chances, he also forbade them eating any meat where the animal is not thoroughly examined, such as were killed by wild beasts or died from injuries or old age.

I might go on describing these dietary laws indefinitely, there are so many of them. I might describe the instructions to the housewife about salting her meat even after all other precautions are taken; the length of time that must be permitted to elapse between the tasting of meat and milk foods, and vice versa; of the various and varied laws in regard to china-ware and culinary apparatus and how they must be kept free from contamination, and many others; but time will not permit it.

Now, a few words concerning circumcision. Is it merely a religious rite or a hygienic duty? The first mention that we meet regarding circumcision is in Genesis, chap. xvii: 10 and 11. It is the command of God to Abraham, in establishing the covenant with him: "This is my covenant which ye shall keep between me and you, and thy seed after thee: every man child among ye shall be circumcised. And ye shall circumcise the flesh of your foreskin; and it shall be a token of the covenant between me and you."

While I cannot agree with some medical authorities who attribute the longevity of the Jew as due to circumcision entirely, I do believe it exercises a beneficial influence and better health, less nervousness, less sickness and loss of time, and that the circumcised are less liable to onanism, nocturnal enuresis, preputial calculus, syphilis, and many induced abnormal

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physical conditions, and also that it probably blunts the desires and weakens the stimulus to carnal passions, which, without further discussion of the subject, would prove the hygienic benefit to be derived from this operation.

If we would take into account all the advantages of the Jews from a sanitary point of view we must not omit the rabbinical laws regarding the bodily purity of man and woman.

For the original of the "mickva" or bath, we must go back to the Tabernacle of Moses with its laver. In Exod., chap. xi, 7, it is said: "And thou shall set the laver between the Tabernacle of the congregation and the altar, and thou shalt put water therein;" and further, in verse 12, "Thou shall bring near Aaron and his sons * * and wash them with water;" and in verses 31 and 32, emphasizing the need of cleanliness as a preliminary to worship, "And Moses and Aaron, etc., washed therefrom their hands and feet. When they went into the Tabernacle and came near unto the altar, they washed themselves."

In carrying out this injunction, the priesthood were evidently to set an example to the people.

Any man or woman who had touched an unclean thing was cleansed only after washing, even then he remained unclean until evening. This thorough cleansing was prescribed also for the woman who had given birth to a child, male or female.

Especially rigid were the preventives against leprosy; similarly any one who had an issue was hemmed in by a wall of preventive measures. Any man that touched his bed or sat on any vessel whereon he had been sitting, or that touched his flesh, was compelled to "wash his clothes and bathe himself and be unclean until evening."

"If he became clean of his issue, he must number to himself seven days for his cleansing and wash his clothes and bathe his flesh in running water." (Lev. xv: 13.)

"If any man's seed of copulation go out from him, then shall he bathe all his flesh in water." (Ibid v: 16.)

"And if a man should lie with a woman with seed of copulation, then shall they bathe themselves in water." (Ibid, v: 18.)

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"And if a woman have an issue of her blood many days out of the time of her separation, all the days of her uncleanliness shall be as in the days of her separation." (Ibid, v: 25.)

The days of separation for a woman are the days during which her menstruation occurs and for seven full days after the cessation thereof, and during this time she is declared unclean.

Now, it might be asked, if the Jew has had such great advantages from a hygienic point of view, why is he not the type of physical development to-day, especially as his laws are among the best and his blood and lineage have remained pure for centuries? My answer to this is, that the wonder is not that these qualities do not exist in him, but the great wonder is that with all his persecutions, he exists at all.

When we consider the manner of his life for so many centuries, in the crowded ghettos with lack of exercise and pure air, the martyrdom which he has undergone on account of his religion, the limited number of occupations which he was permitted to follow, his poverty, and consequent lack of wholesome nourishment, would it not be ridiculous to expect in him the ideal of physical beauty despite his observance of the hygienic laws?

Leroy Beaulieu says of the Jew: His longevity, his resistance to disease, his immunity from certain disorders, are a legacy from his ancestors, and are due to his laws, his customs and his sobriety. On the other hand, his feebleness and the defects of his physical constitution are due to the laws of the country which he inhabited, the ghettos and their system of confinement.

And he further says: The race is growing better, physically and morally; the Jew is growing stronger and becoming a new man as the shackles that weighed him down fall from his limbs.

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PROGRESSIVE PERNICIOUS ANÆMIA.

BY DR. ALLAN C. BROOKS, WILKES-BARRE, PA.

READ FEBRUARY 3, 1897.

Mr. President and Gentlemen:

The term general anæmia may be defined as a reduction of the amount of blood as a whole, or of its corpuscles, or of certain of its more important constituents, such as albumen and hæmoglobin. A term so general must necessarily include various forms which have received the following provisional grouping:

(1) Secondary, or symptomatic anæmia.

(2) Primary, essential, or cytogenic anæmia.

In the secondary form of anæmia both the hæmoglobin and the corpuscles are diminished, though the causes, for the reduction, may be many, as:

1. Hemorrhage.
2. Pathological discharges, such as prolonged lactation, profuse menstruation, suppuration, albuminuria, diabetes, sexual excess and watery diarrhœa.
3. Malignant growths.
4. Animal parasites.
5. Toxic and infective, such as carbonic-dioxide poisoning from tea, coffee, tobacco, alcohol, tuberculosis and syphilis.
6. Mechanical obstruction to taking of food.
7. Fevers.
8. Venous stasis in cardiac and pulmonary disease.
9. Dyspepsia.

In this group of anæmias if the cause can be treated or removed the anæmia is generally cured. The primary group consists of, first, chlorosis, where we find the hæmoglobin diminished and the corpuscles normal; and second, progressive pernicious anæmia, where the corpuscles are diminished and the hæmoglobin is *relatively* increased. Perhaps it may be better to state that the percentage of decrease of corpuscles is greater than that of the hæmoglobin, which latter may fall to twenty per cent.

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Progressive pernicious anæmia was first clearly described by Addison under the name of "Idiopathic Anæmia," who described it chiefly from a clinical standpoint as follows: "For a long period I had, from time to time, met with a remarkable form of general anæmia, occurring without any discoverable cause whatever—cases in which there had been no previous loss of blood, no exhausting diarrhœa, no chlorosis, no purpura, no renal, splenic, miasmatic, glandular, strumous or malignant disease."

In 1868 Biermer revived interest in this affection, coined the name Progressive Pernicious Anæmia, and discussed its pathology. Since then, owing to the microscope and improved technique in blood examinations, a host of observers have studied this disease.

Predisposing causes: *Sex*, more common in females; *age*, early adult life.

Geographically widely distributed, though at one time thought to be particularly common in Switzerland.

Exciting causes, unknown.

The post mortem knife has revealed a liver degenerated, enlarged, the edges thickened and rounded, the surface smooth, the tissue touch firm, inelastic, more or less translucent, and of a brownish red color. Osler speaks of the peculiar distribution of iron in the outer and middle zones of the lobules as characteristic of pernicious anæmia. The kidneys often present a common yet important form of kidney disease—a state of diffuse nephritis. The kidney varies in size, the capsule is opaque and more or less adherent, the surface is finely or coarsely nodular; in the tubes the epithelium may be changed and the walls swollen, granular or fatty. The heart may show transformation of muscular fiber into fat which has collected in the fibers. This degeneration may be and is often the cause of sudden death. Lungs are nearly normal. The blood is scanty and pale, with a specific gravity, in some cases, as low as 1030. The hæmopoietic organs have been the object of careful study. The speen and lymph glands may, however, be unchanged. The amount of yellow marrow is diminished and is apparently replaced by hæmoblastic red marrow. As a

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rule the body is not emaciated as in most anæmias, and the subcutaneous fat is not diminished. Punctiform hemorrhages in the organ and on the serous membranes are quite common. Anæmia is the sneak thief of all diseases. How gradually it creeps through the system to weaken and debilitate, leaving vital energy more or less diminished. How often we see cases of headache, impaired vision, neuralgia, indigestion, constipation, anorexia and a lack of energy in general, all of which originated as anæmia; and the suffering patient does not realize how gradually he slips along into these conditions. Pallor, shortness of breath on exertion, palpitations of the heart, functional murmurs and headache are symptoms that are generally present and should always demand a most careful blood examination. Later in the disease the pallor may become extreme and the skin a characteristic lemon yellow tint, and the ankles become œdematous, the patient growing weaker, his mind wanders, and after a sickness of several months the end comes, yet the bulkiness of the general frame and the amount of obesity often present a most striking contrast to the failure and exhaustion observed in every other respect. Blood examination reveals marked oligocythæmia. Quinche reported a case where there were only 143,000 red corpuscles to the cubic millimetre just before death. The oligochromæmia is not as marked. This point is of diagnostic importance, yet even with the best hæmoglobinometer which we possess the amount of coloring matter can only be approximate.

Megalocytes or giant corpuscles are a constant feature of pernicious anæmia, and are supposed to account for the relative hæmoglobin increase. Hence by excluding causes for secondary anæmia, by the severe grade of the oligocythæmia, by the relative increase in hæmoglobin, by the presence of many giant corpuscles, by the yellow tint of the skin, by hemorrhages, and by its progressive course and inefficiency of treatment the diagnosis of pernicious anæmia is obtained. The adjectives used to designate this form of anæmia also suggest to all that the majority of the patients suffering from pernicious anæmia perish. In fact those who make *death* a necessary factor in their acceptation of the definition justly hold that it

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is a fatal malady, and look upon reported cases of cure as examples of mistaken diagnosis. But since Bramwell, in 1877, introduced the arsenic treatment in preference to the iron treatment hitherto adopted, the results have been more favorable.

Osler reports two cases out of twenty-eight having recovered under Fowler's solution. Commencing with three minims of Fowler solution after each meal, and increasing to five at the end of the first week, to ten at the end of the second week, and so on until the patient is taking twenty to twenty-five minims thrice daily. If the eye-lids become œdematous the amount of arsenic must be decreased.

At the beginning of the treatment rest in bed is necessary. A systematic massage treatment is often of great benefit. Fraser, in the British Medical Journal, June 2, 1894, reports one case of pernicious anæmia where the blood count was 1,860,000 reds, with thirty per cent. hæmoglobin, which, during the administration of full doses of arsenic and iron, the corpuscles fell to 843,000, and the hæmoglobin to eighteen per cent. Ox bone marrow, uncooked, was then added to the treatment, three ounces daily, with almost immediate improvement. Twenty-two days after beginning the bone marrow the corpuscles were 3,400,000, and the hæmoglobin seventy-five per cent. The patient was discharged after three months with his blood in this condition, and feeling "as though he had been made over again."

Rectal injections of dried blood have been tried, also blood transfusion. Temporary relief has been obtained by a warm physiological salt solution injected into the subcutaneous tissues.

DISCUSSION.

Dr. S. P. Mengel.—The man to whom we are indebted for the description of this disease was Addison, whose paper appeared in 1855. Since his time numerous cases have, from time to time, been reported as idiopathic. Indeed, authorities to-day widely differ in their opinions as regards the etiology of this disease, some claiming it to be idiopathic, while others express their convictions that it is not a disease in itself, but merely a grave form of ænemia. As authority for the latter

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opinion, which I believe to be the correct one, I would quote Ralph Stockman, of Edinburg, whose essay appeared in the British Medical Journal, 1895, and Dr. F. P. Henry, whose opinions as regards the blood diseases we have the greatest respect for. Dr. Henry says: "I have, for many years, maintained that the arguments in favor of the 'idiopathic,' nature of pernicious anæmia are very faulty."

Pernicious anæmia develops in direct or indirect consequence of any exhausting condition, such as atrophy of gastric mucous membrane, prolonged diarrhœa, hemorrhage, chlorosis, poor feeding, etc. It is believed that in certain individuals degenerative changes of the blood vessels occur permitting minute hemorrhages all over the body. An argument in favor of the non-idiopathic view of disease is the fact that in recent years the presence of the Bothriocephalus latus and the Anchylostomum duodenale has been recognized as a cause of pernicious anæmia. These cases were formerly thought to be idiopathic. Exactly how they produce the anæmic condition is still a question to be decided, but it is thought to be produced by the parasite sucking the blood from the vessels of the intestinal mucous membranes, producing what is equivalent to an external hemorrhage. We believe a distinct cause to be present for each case of pernicious anæmia and that it is only a question of time until authorities agree that the disease is not an idiopathic one.

The iron deposited in the liver, spleen, pancreas, kidneys and brain is thought by Stockman to be due to the hæmoglobin of the numerous minute hemorrhages becoming altered and which thus liberates in the circulation a large amount of iron containing pigment. This is deposited in the liver and other organs. If the bleedings be numerous the pigment is taken up by many organs, if few, chiefly but not exclusively by the liver. An interesting fact I would call your attention to is that patients accustom themselves to getting along with less and less hæmoglobin in cases of repeated small hemorrhages. We are called to the bedside of a patient a day or two after a severe hemorrhage almost causing death, we examine his blood and find R. B. C. 3,000,000, or at the least 2,500,000, and his hæmoglobin reduced to sixty or fifty per cent. We examine blood of a case of pernicious anæmia and find R. B. C's reduced to 1,000,000, or as a case was reported 395,000, and hæmoglobin ranging from eighteen to twenty per cent. Chronic loss of blood is therefore much better borne than acute loss, and goes on to a much higher degree without causing death.

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DIABETES.

BY DR. GEO. A. CLARK, WILKES-BARRE, PA.
READ FEBRUARY 17, 1897.

Mr. President and Fellow Physicians: I present for your consideration a subject which has long defied the most advanced methods of scientific investigation as to etiology and morbid anatomy in their bearing upon its rational treatment.

The problematical character of the whole process and its etiological obscurity render it, even in the light of modern research, somewhat an object of dread to the profession. Occasionally we hear of a reported cure, but many such reports are undoubtedly based upon the improvement seen during the intermission or remission sometimes noted in its course.

Some of the older authorities located this morbid process among the diseases of the kidneys, though later it was no longer classified as a renal disease. Celsus was probably the first to clearly describe the disease. Arætus, during first century, and Galen, second century, first describe it under the name diabetes. In 1674 Willis first associated the presence of sugar in the urine with the disease, and in 1787 Rollo commenced the diatetic treatment of diabetes by withholding vegetable food. In 1823 Gmelin found that sugar is formed by digestion of the carbohydrates. In 1835 Ambrosiana demonstrated sugar in the blood. In 1848 Claude Bernard began his exhaustive researches. Since that date a host of observers have contributed extensively to the knowledge of the disease.

Diabetes is more common to-day than forty or fifty years ago. It is commoner among the wealthy than the poor because of sedentary habits and overindulgence in eating. With regard to recent researches we must say that while diabetes is now more successfully treated, all investigation does little beside the confirmation of evidence of the older authors. Within the last ten years advances have been confined chiefly to the field of dietetics and hygiene, and many valuable ideas have been presented. The disease occurs oftenest among males, in proportion of about 2½ or 3 to 1. From this fact it would

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seem that occupation would constitute an indirect influence favorable to its development, males being more exposed to various hardships and injuries than females. In women it is less acute and fatal after the menopause. The Hebrews have been found to be more susceptible to diabetes, and among the races least so, the negro probably takes the first rank. It may occur alone or associated with a variety of diseases, notably those of the liver, pancreas, lungs and nervous system.

Among the predisposing causes heredity can be traced as a factor in about one-fourth of all cases. Many authors note the frequency of other constitutional affections in the families of those suffering from the disease. A family history of obesity or gout is regarded as of special significance. Cases are reported in which a generation escapes the diabetic taint, but instead are gouty. The disease may occur at any period from infancy to old age—commonest between 25 and 45 years.

Strümpell (Berl. Klin. Woch., Nov. 16, 1896), says that "the problem of diabetes must remain unsolved so long as it is unknown how the sugar molecule is destroyed by the body." The normal capability of the individual to burn up sugar is not an unlimited one. If more than two hundred grains of grape sugar be introduced into the body, glycosuria appears. This, however, varies in different individuals. "Alimentary glycosuria," Strümpell further states, "does not depend solely upon the amount of sugar introduced, but also upon the rapidity of absorption." If the hereditary disposition is very great then the disease progresses without the intervention of other causes. It is probable that a large number of cases, especially in the comparatively young, belong to the hereditary influence. Diabetes may be associated with spinal muscular atrophy and acromegaly. Syphilis also superinduces it.

As alimentary glycosuria is frequent in beer drinkers, no sharp line can be drawn between this condition and true diabetes. There appears to be no other external cause, except certain poisons, which interferes as much with the destination of sugar in the body as long continued excesses in beer drinking. The relation of this fact to prophylaxis and dietetic treatment is obvious. Exposure to cold, wet and fatigue, especially

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during menstruation, convalescence from fevers such as relapsing fever, emotional strain and worry, mental fatigue and anxiety are well known causes. Tumors and hemorrhages at base of brain, lesions of floor of fourth ventricle, meningitis, over-indulgence in food, particularly of a rich proteid or hydrocarbon nature, are potent causes. Malarial congestion has been followed by diabetes, also neuralgia, phthisis, and hepatic disorders, but the relations of cause and effect are not well understood. In a case of pyosalpinx, complicated by diabetes, the ovary was removed and the diabetes disappeared nine days later (Brit. Med. Jour., July, '85.) Another case reported consequent upon the presence of a tape-worm, cured by removal of the worm. The peripheral irritation of sensory sympathetic fibers may have been conveyed to the diabetic center in the medulla, and reflected to the vaso-motor system of the liver.

Whatever views of the etiology of diabetes are at present entertained may be modified by future research, though, as we have shown, the changes are more clearly seen in the treatment than in the etiological solution. It seems evident that error in the digestion of proteids must be held responsible for the presence of the glycosuria. Irritation of the vaso-motor area in the fourth ventricle, of a mechanical origin, invariably produces glycosuria. Such irritation may result from shock or concussion, cerebral hemorrhage, softening, cirrhosis, abscess or tumors, as cited heretofore, excessive mental labor, grief, and possibly the excessive use of cerebral stimulants. Of late the pancreas has received considerable attention as a possible factor in this morbid change, and as primarily responsible. An attempt to go into the symptomatology will not be made, as it would result in a needless recital of facts already familiar.

Regarding the pathology, it cannot be said at the present time that any constant lesion or lesions have been found in the liver, kidneys, nervous system, or elsewhere in the body. The liver in different cases has been found hyperæmic and congested, cirrhotic, enlarged, atrophied, amyloid, or filled with abscesses, thus presenting no uniform lesion. Obliteration of the portal vein has been noticed. New tissue has been formed in

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the intra-lobular plexuses. There is enlargement and proliferation of hepatic cells, and they are markedly granular and nucleated. The pancreas is in some cases congested. In the kidneys catarrh of the pelvis and ureters has been found, and various stages of nephritis. The renal arteries and tubules are greatly dilated owing to the work thrown upon them. The epithelium is swollen and interstitial tissue œdematous.

Frerichs says that hyaline changes in the tubules due to deposit of glycogen are constant. Where pneumonia has existed glycogen is found in the pulmonary tissue. The heart may be fatty or atrophied. The alimentary canal shows evidences of chronic catarrh in many cases. The spleen is not generally altered. The testes may be atrophied in the young. The blood has been found in some to contain sugar, nine parts per one thousand. Anæmia is usually present. In the central nervous organs some observers have found small serum-filled spaces around the arterioles of the gray matter on the floor of the fourth ventricle and in the olivary bodies, and colloid masses, the size of leucocytes and upward, have been discerned in the corpus striatum and optic thalami, and gray matter of the hemispheres. Tumors and infarctions are sometimes seen in the neighborhood of the fourth ventricle. The medulla is sometimes soft, and may be the seat of a blood clot. "The cerebral arteries and perivascular spaces are dilated." (Dickinson.)

We must, after all, admit that, as yet, pathology throws but little light on the therapeutics which should be applied. As to the treatment, prophylaxis, hygiene, and dietetics are of first importance. No medicinal remedy has been found which is curative, and very few which are even palliative in any number of cases. Definite rules for prophylaxis cannot yet be established, but when there is distinct heredity to be found, or when the lithic-acid diathesis is present, all excitement of the nervous system, mental or physical, as well as over-indulgence in alcohol and sweets, should be avoided. Hygiene is a stronghold which should not be overlooked. Fresh air, with moderate exercise without fatigue, are extremely important. Flannels should be worn next the skin. Wherever practicable stimulate

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the perspiration. For this purpose turkish baths may be employed by the more vigorous, and massage for the feebler patients. The care of the skin is of great importance. A very distressing symptom consequent upon the frequent passage of urine over the external genitals, that of excoriation and pruritis, can be remedied by close attention to cleanliness and bathing.

A number of writers have demonstrated the importance of muscular exercise in diabetes, the amount being carefully adapted to the patient's capacity. Constipation, if it occurs, must be carefully combatted. This can usually be done by regulating the mode of living, or a mixture of rhubarb, soda and sulphur usually acts well. The diet should be regulated before resorting to medication. Most patients do better when allowed a little starch, in shape of bread and sugar, in their diet, otherwise the craving does harm. The diet should not be too suddenly reduced. The general principles should be to excluded from the diet, when possible, all those articles which are most likely to result in the formation of sugar, and to devise means for the relief of the craving for starchy and saccharine foods which patients kept on a nitrogenous diet are certain to experience. The principal foods to be allowed are soups made of meat—meat of all kinds, fish, eggs, fats, and vegetables such as lettuce, asparagus, spinach, cress, radishes, cabbage, carrots, parsnips, egg-plant. Osler says that because potatoes contain less starch than may be found in bread they may sometimes be allowed in moderation when the latter is found to disagree. A number of substitutes for bread have been devised, but none of them are wholly satisfactory, either containing a large percentage of starch, or are unpalatable and not sufficiently nutritious.

The medicinal treatment is rather unsatisfactory. A large array of drugs have been advocated, though many of them are of doubtful value. Strychnia and ergot are sometimes beneficial—they regulate arterial tension, reduce amount of urine, and relieve thirst. Opium is successful in some instances in reducing the amount of sugar. Arsenic, salicylates, creasote, atropine, pilocarpine, potas. brom., all seem useful in some cases.

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Alkalies have long been employed. A remedy recently employed with some success is Clemen's liq. arsenici bromati, a solution of arsenious acid with bromine in glycerine and water. Initial dose 1 to 2 drops, increased to 5. Cod liver oil, tonics, and mineral acids are frequently indicated. To relieve the intense craving for food seen in some patients, Roberts recommends a two or three grain asafœtida pill three times a day.

Finally, in closing, I will say that we must ever attempt to bring to bear the most advanced rational methods of our time, and which we are confident will yield the best results for our patients. A generous measure of success will be ours if we are assiduous in our labors for the betterment of our race.

DISCUSSION.

DR. J. I. ROE cited two cases illustrating the extreme varieties which the course of diabetes may take. One was a case which proved very rapidly fatal, the case coming under observation only a few hours before death. The other case was one discovered early, and by careful restriction of diet rigidly maintained the patient was enabled to live very comfortably for some twelve or thirteen years. I have been using the Whitney test for sugar for some time, and find it very convenient and satisfactory. As a substitute for sugar in the diet, saccharine has been used with satisfaction.

DR. BARNEY.—Diabetes, as disease, has many degrees of severity. It may be mild, moderately severe, and very severe. Our success in treating it will depend largely upon the degree of severity. So we see cases which will last many years, and some which prove rapidly fatal. But the end is the same almost invariably. The only treatment which offers any degree of success is, as the essayist has said, is the dietetic treatment. Since we cannot stop the drain of that valuable economic substance, sugar, through the kidneys, we must limit it as well as we may, by cutting off the supply of the sugar-making materials.

DR. WEAVER.—I want to call attention to the fact that while glycosuria is a frequent cause of carbuncles, and the urine should be tested to discover whether diabetes exists, I am prepared to say that carbuncles *always* cause saccharine urine. We must, therefore, not mistake cause and effect.

DR. STOECKEL.—In the Woman's Hospital of Philadelphia

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it was the usual practice to examine the urine of patients presenting themselves suffering from carbuncle, and glycosuria was invariably found to be present.

DR. N. ROSS.—I corroborate Dr. Weaver's remarks in regard to diabetes occurring in patients suffering from carbuncles. Two years ago I attended a female patient suffering from carbuncles, and on examining the urine found it heavily loaded with sugar. Since the carbuncles disappeared patient has enjoyed good health on a mixed diet.

INTUBATION AND ANTITOXIN IN MEMBRANOUS CROUP.

BY DR. HENRY KUNKLE, KINGSTON, PA.

READ MARCH 3, 1897.

Mr. President and Fellow Physicians:

In reading this paper I do not intend to present an original and exhaustive study of the subject, nor an individual experience sufficiently large to be conclusive, but rather to show, from the records of other men, some of the good results and advantages of an operative procedure, which, as it seems to me, has certainly not received the attention which it deserves, but for some reason has been greatly neglected. I shall aim, as far as possible, to be practical. My small experience in this method of treatment, in conjunction with antitoxin, has so impressed me that I was prompted to read this paper to-night, and if I succeed in awakening an interest in this subject and thus help some one to save a few patients that otherwise would be lost, my object is accomplished.

HISTORY.

The operation as now practiced in this country and in Europe is distinctly an American invention. The first attempt to introduce a tube into the larynx to overcome stenosis from croup was made by Bouchut of Paris, in 1858. The tube used by him was a hollow cylinder less than an inch long, narrower at the

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lower end than at the upper. To secure the tube from slipping down too far and afterwards to remove it he attached a silken bridle which was brought out of the angle of the mouth. But he had only seven cases with no recovery to recommend its use. The Academy of Medicine of Paris, with Trousseau as chairman of investigation, denounced it as a substitute for tracheotomy, and considered it impracticable. For nearly a quarter of a century no further attempt was made at intubation. In 1880, Dr. Jos. O'Dwyer, of New York, began his experiments in the autopsy rooms of the New York Foundling Asylum, unaware of the failure of Bouchut, and the condemnation of the method by the academy at Paris. His first attempt was with a bivalve speculum. This, while temporarily relieving the dyspnœa, was unsuccessful on account of the swollen mucous membranes protruding between the separated edges of the valves and again obstructing the air passage. Let me say, in short, that many experiments and modifications gradually led to the tube as now perfected by O'Dwyer, and as now used both in this country and in Europe. We might go into details as to the changes it has undergone, giving reasons for the same, but as this would materially detract from the practical nature of this paper, let me simply repeat that O'Dwyer's set of six tubes ordinarily meets all cases of croup in children from one year old, or below, to twelve years of age. Now, to come to the more practical aspect of this subject, let me say that the results obtained by the combined use of antitoxin and intubation in membranous croup is such as is unparalled in the medical and surgical treatment of any other disease known; even the greatly reduced mortality and results in abdominal surgery since Listerism bear no comparison with it. And the reduction of mortality—the saving of our patient by whatever means accomplished is always the object sought—and the crucial test of our ability to cope with a disease, that fell destroyer of life. And we all know what a terrible disease to contend with membranous croup is. We all have observed that harsh, hoarse cough, the gradual oncoming dyspnœa, the awful struggle for breath, the heaving and retraction of chest, the restlessness of our little patient, the livid countenance, and finally the stupor of carbonic acid gas

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poisoning, and death. And all this in spite of our best efforts to relieve him.

The mortality under different methods of treatment has generally been very high. I shall attempt to give figures only approximately, as I do not believe in quoting statistics too closely on medical and surgical subjects. Some physicians, at times, report having saved a number of cases by various methods of treatment—by such as are actively derivative and anti-phlogistic, by steaming, with the idea of softening and dissolving the membranes, and last, but by no means least, by the various mercurial treatments. Yet, in spite of all, the percentage of deaths prior to serum-therapy has been frightful. The best authorities state that ten per cent. was the average number of cases saved formerly without the aid of operation, either by tracheotomy or intubation. These are the figures given by O'Dwyer, who has made a collective investigation of the cases. Rosenthal says he does not believe that he used to save more than five per cent. While in 100 cases aided by intubation he saved 38. In 1893 McNaughten and Maddern of Brooklyn made a collective investigation of the tracheotomies and intubations performed in the United States and Canada, giving an aggregate of 2417 tracheotomies for croup with 586 recoveries, or 24.2%, and 5546 intubations with 1691 recoveries—30.5%. The same year F. E. Waxham of Denver reported 466 cases intubated for croup with 161 recoveries—34.5%

In 1894 Ranke of Munich, as the result of a collective investigation on intubation in Germany, reports an aggregate of 1445 cases with 553 recoveries—38%, and says as follows: "This number proves for itself that intubation, which at first and until lately was severely fought on all sides, has, in the course of a few years, gained more and more friends on this side of the Atlantic also, and it proves that the dangers which were formerly charged against this operation must have been greatly exaggerated." Bokai the same year gives an individual experience of 500 cases without any serious accidents, and up to date of serum therapy, 673, with 33.3% of recoveries. Many other statistics could be cited, some not as favorable as

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those given above, while others are even more so. Taking the statistics altogether, of large and small operators, a fair estimate would be that at least 30% were saved with the aid of tubes. Comparing this number with 10%, the number saved without tubes, we have the ratio of 3 to 1, *i. e.*, three times as many were saved with tubes as without. This was a great gain, and many a life has thus been saved that otherwise would have been lost. But O'Dwyer says, "all statistics that antedate the serum treatment of croup are of no further value except for purposes of comparison." Welch, in an exhaustive paper on treatment of diphtheria by antitoxin, says, "no one can claim that laryngeal diphtheria, requiring intubation or tracheotomy, is anything but a severe disease"; and also says "an agent which would arrest the progressive descent of the diphtheritic process from the larynx into the bronchi, and hasten the disappearance of the obstructive exudate, is just what was needed to make intubation the ideal operation for the relief of the great majority of cases of croup requiring operative interference. Such an agent we now possess in antitoxin for a large group of cases, and we are not surprised, therefore, to find that the employment of intubation as a substitute for tracheotomy has been greatly extended by the introduction of serum therapy." This means that a great many of the objections which formerly have been urged against intubation are now removed; and that consequently we can now naturally expect much happier results than formerly. And this the limited experience and investigations now available clearly show, and I feel confident further investigation will fully corroborate. A process of collective investigation is now in operation by the American Pediatric Society, which sent out papers to antitoxin users to be returned by April 1, that will show how many cases recovered without operation and what per cent. of those operated on recover with its aid.

From all statistics I could find I concluded that it would be fair to say that about 50% recovered by use of serum therapy alone without operation. Rosenthal of Philadelphia says that "the number of cases in which operation was not necessary was greater than the number operated upon," which he attri-

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butes to the early use of antitoxin. Then, again, of all the statistics available, we find that from 60 to 80%, or an average of 70% of the remaining 50% of the more serious cases (considering the serious nature of these cases, a saving of 70% is certainly a remarkable showing) can be saved by intubation. And for the purpose of comparison with former methods of treatment, if we add the 70% of 50% or 35% of recoveries made possible by intubation to 50% requiring no intubation, we have a saving of 85% of all cases of membranous croup. I know you will say I am an enthusiast and too hopeful, but I fully believe that physicians who use antitoxin rightly, and who have fully acquired the technique of intubation, find that these results are not impossible, but will be the results attained, if not improved upon, by a fuller experience in these methods. Now, since records show such an unparalleled success and advantage in this combined method of treatment, let us go over some of the essentials in the operation, which we will, in short, discuss under several heads, viz:

1. When to operate.
2. How to operate.
3. When and how to remove the tube.
4. Dangers and difficulties of the operation, of wearing and removing the tube, and thereafter.
5. Feeding after intubation and treatment medicinally.

1. *When to operate.* Since, after mastering the technique, the operation is comparatively a simple and devoid of much danger and shock, it is always advisable to operate early. One advantage of this operation over tracheotomy is that parents will rarely object to it, and thus the operation can be done in time instead of as a final resort. We can easily see the necessity of doing any operation early if we would have the best results, when we consider the great muscular exertion and consequent exhaustion, the devitalization of tissue generally by the diphtheria toxin, the carbonic acid poisoning, and last, but not least, the paresis or partial paralysis of lung tissue occasioned by the lack of equalization of atmospheric pressure. This state of paresis of lung tissue under the devitalized, poisoned and

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exhausted condition of the system generally, I believe in a great measure is the cause of pneumonia, which quite often follows cases of intubation and tracheotomy. The exhausted condition of the heart which necessarily follows under these unfavorable conditions must also be considered, and while the condition of the lungs and heart deserves particular attention, it is apparent that the general worn-out condition which must always follow severe stenosis, points to the necessity of early operation. The rule generally followed is to operate as soon as there is considerable recession of the supra-clavicular and infra-costal muscles during the inspiratory act. We should not wait until marked cyanosis makes its appearance. We should be guided more by the *continuous* and *gradually increasing* dyspnœa than by the occasional and temporary attacks of difficult respiration. When the dyspnœa is marked and continuous, any further delay is dallying with our patient's life. While if the labored breathing occurs only occasionally, instead of continuously, and is not increasing in severity, delay is justifiable; especially since the introduction of serum therapy, because many cases in which the dyspnœa at times is marked will recover without operation.

2. *How to operate.* A full description of how to operate will take up unnecessary space and time in a paper of this kind. While all of you have access to books which give quite full and clear descriptions of the method of procedure, I might add a few words as to the difficulties of introducing the tube. Some physicians possess such a degree of manual dexterity and skill in manipulating that they will find no difficulty in introducing a tube at their first attempt, while the majority may find a good deal of difficulty. O'Dwyer dwells upon the necessity of an experience upon the cadaver before attempting to intubate the living. While this experience is not always absolutely necessary, as is proven by the fact that a good many have acquired skill in doing the operation without such previous experience, yet it is always desirable. I could, with pleasure, point to one amongst our number who, within the last few weeks, has operated twice in my presence very successfully. Yet I have seen a physician in the morgue in New York

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work on a cadaver an hour or two at a time for four successive days before he succeeded in introducing a tube, and about as much longer before he could remove it, while others succeeded almost at the first attempt. When I started this paper, owing to the ease with which a tube is generally introduced by one accustomed to it, half a minute often sufficing to place the gag and tube, I felt like recommending every physician to get a set of tubes and do the operation when required. Further study of the subject convinced me, however, that it would generally be better for a few physicians in each community to avail themselves of every opportunity on the dead and living to acquire the technique and skill, and have them do the operation instead of every one attempting it. For records plainly show that most serious accidents can generally be avoided and best results obtained only by those having skill and experience in operating.

3. *When and how to remove the tube.* The method and time of removing the tube is also clearly described in books, but as there are different methods, with their advantages and disadvantages, a few words may not be amiss. Formerly O'Dwyer ordinarily left the tube in the larynx as long as six or seven days without removal, unless there were apparent reasons for removing it sooner. Such reason might be the collection of tenacious mucus in large quantity in the bronchial tubes, the clogging of the tube and obstruction of it either by pieces of membrane in the tube or below it, or the formation of chalky concretion, in which case the tubes were removed, cleaned and reintroduced when found necessary. The custom among European operators has been quite generally, the removal of the tube every day or two. Their custom also has been generally to leave a string attached, which of course greatly facilitates the removal. Since the introduction of antitoxin the tubes generally can be removed permanently at the end of three or four days.

The period of intubation has been greatly lessened, as shown by the paper of Rosenthal read before the State Medical Society last spring. In a good many cases two days would be sufficient to overcome the stenosis; for we all have seen the marked reduction of the size of membrane in the pharynx in two

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days after injection. But in removing the tube early, in fact at almost any time, we should always watch our patient for some time to see whether any remaining membranes, the pressing in of the swollen mucous membranes or collapse of the vocal cords will not again cause obstruction. And as this at times makes its appearance very suddenly, it is always advisable to have another tube ready for immediate use; for if not thus prepared the case may end fatally before a tube can be replaced. *As to how to remove the tube*, I might also add a word. When a string is attached, as is customary in Europe, the removal is so easy as to need no description; but when the string is detached, as is generally done by American operators, extubation is not so easy; in fact, it is a good deal more difficult to extubate than to intubate. To facilitate its removal, various methods have been tried. Dillon Brown has devised an ingenious plan by attaching a wire in shape of a semi-circle to the upper end of the tube, and by means of a hook fastened to the end of the index finger the tube is caught by the wire and extracted. Some operators succeed in forcing it out by external pressure. Cheatham of Louisville, Kentucky, has been practicing this successfully. This can be done more easily on the young in whom the cartilages of the larynx are yielding. O'Dwyer says, on the cadaver this is easily done, but he has not tried it on the living. Other methods, such as the electro-magnet, &c., have been tried; but generally all are more or less impracticable; so the only way left is to acquire skill and practice on the cadaver if possible.

Coolness is, however, an important aid to success. There usually is no hurry except when intubation is done to overcome some obstruction. So that coolness can be exercised more freely. It is better to make a number of short attempts than one too prolonged. This also, in most cases, applies to the attempt at introduction of the tube.

4. *Dangers and difficulties of operation, of wearing the tube, the removal of it, and dangers subsequent to its removal.* I would not do justice to this subject did I not recount some of the less favorable aspects of this useful operation. It does not prove that the operation should be discarded on account of some

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unhappy results we may meet with, but it emphasizes the fact that skill, care and judgment are essential to obtain the best results, and in a great measure to avoid these unhappy results and accidents. Among the dangers of operating I will *first* mention that of pushing down the loose membrane ahead of the tube and thus causing obstruction to breathing. Any serious results from this can, with very rare exception, be prevented by leaving a string attached till you feel sure that no such obstruction exists. Should there be any obstruction by crowding membrane ahead of the tube, extubate immediately by means of the string and the obstructing membrane will generally be coughed out. Bokai, in 500 operations, had not one fatal case from such an obstruction. *As a second danger* I may add, a too prolonged effort at introducing the tube, may completely exhaust a patient already near the point of succumbing, or produce asphyxia of the patient by cutting off the small amount of air, especially when patient is already cyanosed. But as the time required to do the operation after acquiring skill is usually very short, the danger from this is very slight; especially if several short attempts rather than a too prolonged effort at introduction are made. Another danger after tube is introduced, is that of membrane below the tube in the trachæ becoming detached and closing as a valve around the lower end of the tube and thus obstructing expiration. This is perhaps the greatest of all dangers of wearing a tube, and is the principal cause of the sudden deaths that occur from obstruction. But this danger is now in a great measure prevented by the use of antitoxin, which prevents the downward spread of membrane. I must also mention the danger of the tube entering the ventricle of the larynx while introducing it. This accident, says O'Dwyer, is not infrequent in unskillful hands; but the present form of tube, and the fact that the ventricle is usually obliterated by the membrane present, prevents this accident from happening often. There is more danger if the tube is re-inserted after the membranes have partly disappeared. While introducing a tube we must not lose sight of the fact that we are dealing with diseased tissues, which are easily wounded and irritated, and even if sufficient trauma is not pro-

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duced to be in itself serious, yet such wounding of tissue may lend its aid to an unfavorable termination. Of other dangers after the tube is introduced, that of pulling or coughing it out, purposely or accidentally, by patient or nurse, in the absence of some one skilled to introduce it, must be remembered. The pulling it out can occur only when a string is left attached, and for this reason I believe it generally is best to remove the string. The sudden obstruction of the tube from loose membranes below, as mentioned above, would, however, be a good argument in favor of leaving the string attached. There is also some slight danger of the tube causing necrosis of tissue from pressure and causing the formation of granulation tissue. This more frequently occurs when the tube has to be retained for a long time, but since the use of antitoxin has greatly reduced the time necessary to wear it, these dangers, which never were frequent, are now less so. The danger attending the removing of the tube are, again, that of wounding and irritating the tissues of pharynx and larynx, and causing subsequent swelling to such a degree as to necessitate its reinsertion. There is also the danger of forcing the tube down the larynx below the vocal cords, thus greatly increasing the difficulties of removing it. This generally happens by pressing down on the tube with too much force, or after dilating the upper part of the larynx by accidentally passing the extractor to the side of the tube in the larynx and opening it while thus placed. There also remains the danger after removing the tube of collapse of the vocal cords, caused by paralysis of same, and by pressing in of swollen tissue, as mentioned above; this, as also stated above, can be temporarily remedied by re-introducing the tube, and generally after a short time it can be removed permanently without further trouble.

5. *Feeding after intubation and medicinal treatment.* Feeding is at times quite difficult after the tube is placed. This difficulty arises mainly from the fact that the epiglottis does not tightly close down on upper end of the tube, and while the patient attempts to swallow some of the substance will enter the tube and provoke coughing. There is a great difference in this respect; some swallow almost everything with ease, while

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others have considerable difficulty in swallowing anything. In the majority of cases, however, this can be so far overcome as not to seriously interfere with proper nourishment. Some swallow most easily while sitting up, others while lying down with the head lower than the body, either on the back or face, while still others will do so most easily while lying on the side. Semi-solids are often most easily taken, such as bread well soaked in milk, ice cream, custard, etc.; but should all attempts fail enemata must be given. *Medical treatment* must not be overlooked. Of course I assume that you will give antitoxin *in rather large doses* in all cases of diphtheritic croup; and strychnine in small doses to tone up the heart is generally indicated; also something to loosen the mucus may be necessary; and finally, I think mercurials in some form are generally beneficial.

Here I had intended to cite my own cases, which number fourteen, giving a short account of each; but as the paper is already unduly prolonged, I will give only a few data in regard to them. Of these fourteen, eight recovered, which, taking into consideration the cases intubated, is a fair showing; but since the object of this paper is more particularly to show the results of diphtheritic cases in conjunction with the use of antitoxin, I will consider only the patients in which antitoxin was used. In eleven antitoxin was injected; ten of which undoubtedly were diphtheritic, while one I feel safe in saying was not, which leaves ten diphtheritic cases with eight recoveries. In justice to the operation I ought to say that one out of the ten should be excluded, as it was intubated with scarcely any hope of recovery, but only to relieve it. This one case was a Polish child two years old, extremely emaciated, exhausted and ænemic from having had croup from Monday till Thursday without treatment, leaving the child almost moribund. It died eighteen hours after operation. But taking eight recoveries out of ten diphtheritic cases in which antitoxin was used we have certainly a very good showing. In conclusion, I want to call your attention to a few points:

1st. When you decide to intubate do so *in time*, before you have that crippled condition of the lungs, heart and the general exhaustion described above.

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2d. Operating early is both *practicable* and *justifiable*. It is practicable because you can always get the consent of the parents; while, if they do consent to tracheotomy, it is only as a final resort. And the operation is *justifiable when stenosis becomes continuous and marked*, because, if done carefully and with skill, there is but very little shock or danger.

3d. The operation as *compared with tracheotomy is preferable because of the shorter time of treatment necessary*. With the use of antitoxin three or four days is sufficient time to overcome the stenosis and render the patient almost well, without leaving a scar or wound to treat for a few weeks longer.

4th. Intubation is preferable because of its better ultimate results, a smaller mortally as compared with tracheotomy, especially in children below two years. The reason for better results being partly due to the causes described above.

5th. Finally, intubation is indicated for the instant and marked relief which it affords our patient. I do believe there are very few physicians who, after observing the happy effect, would feel justified in letting these little patients die without giving them the relief the tube affords.

NOTE.—Since reading the above paper I have operated upon ten additional cases, with seven recoveries.

DISCUSSION.

DR. H. L. WHITNEY.—My experience has been limited to eight or nine cases. I do not agree with the author of the paper that only a specialist should attempt the operation. The technique is readily acquired. It requires some assurance in the first case, but in the event of failure to introduce the tube no harm is done, provided ordinary care is used. At first I did not have the assurance to properly shove the tube down well under the epiglottis, and as it was only partially introduced, it was soon expelled, but this opened the larynx sufficiently to temporarily relieve the dyspnœa. It requires considerable firm force to shove the tube into the proper place. The three cases which recovered were those in which no diphtheritic membrane was visible, but it developed two or three days later, although in a very mild form. In regard to nourishment, I have found that it is the last swallow that chokes and causes violent coughing. In other words, a whole cup of milk may be swallowed at one effort and no coughing will take place until after the final swallow taken.

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THE MODERN CONCEPTION OF THE NERVOUS SYSTEM.

BY DR. CHARLES P. KNAPP, WYOMING, PA.

READ MARCH 17, 1897.

The investigator in medicine and the sciences allied to medicine is rarely a clinician. His discoveries, theories and hypotheses, to be of practical value, must be weighed and measured by the physician. The fasciculi of the laboratories are so numerous that the practicing physician can with difficulty keep abreast of them; it must, therefore, fall to the lot of some of us to present to the profession, through the societies, at times, a brief conspectus of advanced work in the various departments that have especially been reviewed in his line of work or reading, arranging the deductions of the investigator, according to his experience, and handing them down to his brethren, to be still further tried in the alembic of daily work.

The cumbersome title of this very elementary paper is suggestive of extensive and exhaustive work. It is in reality nothing of the kind, but merely a compilation of facts, theories and hypotheses, that have attracted the attention of the writer, in the past few years, in that field of fiction, romance and startling adventure, the nervous system, which has been opened up to a clearer view by more expert work with the microscope, and the discovery of differential stains.

The members present to-night, who have had occasion to consult a modern work on diseases of the nervous system, during the past year, unless a very recent graduate or a student of physiology, has no doubt been somewhat mystified by a nomenclature he did not meet with in his student days. NEURON, AXON, DENDRONS, GEMMULÆ, COLLATERALS, ENDTUFTS have rather confused him, and the morphology of the nerves, as he learned them, namely, nerve cells and nerve fibers, each possessing peculiar vital properties, do not aid him to grasp the reference he is reading. To those who have experienced

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the above I need not apologize for this paper; those who are up and abreast of the work in this field I ask them to heartily aid me in this discussion.

The cell thus far measures the limit of our science of physiology and pathology. Protoplasm is the wall against which we are concentrating our forces. It must yield to the indomitable energy of man, when human life and happiness are at his back, not to dynamite or cannon, but only to the smallest ray of light and the finest chemical reaction.

The latest definition of the nervous system, that of Donaldson (American Text Book of Physiology), says that it is a mass of separate but contiguous nerve cells, and, as a system, differs from that of the bones, muscles and glands, since these tissues are distributed throughout the body, in masses more or less isolated, while the nervous system is continuous throughout the whole body, and by virtue of its contiguity puts into connection all other systems of the body; furthermore he says the divisions of the system into central and peripheral, spinal and sympathetic, while convenient, do not exist in fact, as they merge imperceptibly into one another, and that we should not conceive of them as having sharp or well defined boundaries; still it is convenient to say that the innumerable branches carry the impulses from without inward to the brain and spinal cord, and in consequence of these impulses, other impulses pass out to the muscles, blood vessels and glands, and it is also important to know that the impulses from without must reach the center before an outgoing impulse is generated. The uniform working of all the systems within the body, and the relation of the body to its environment, is under the control, equalized and balanced by these administrative cells.

The growth and organization of this system is unique and peculiar in comparison with other tissues of the body. Other organs and tissues are either well developed in youth, or merely increase in size, but not in complexity, with advancing years; not so the nervous system. Its connections are incomplete and poorly established in youth; it develops better and more numerous physiological pathways at maturity, so that the ma-

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ture can do better things at or after maturity, and also things he could not do at all before.

Again, it is with the nervous system that the phenomena of consciousness is linked, and while in its physiological and anatomical study we attempt to treat of it without an appeal to consciousness, holding the latter as sacred to psychology, it is still impossible not to trespass somewhat upon its domain.

At the present time it is the more usual habit of the physiologist to treat of this system (1) as a peculiar kind of tissue element endowed with special physiological properties, that is the NEURON; (2) the activities of the simplest groups of these elements, the grouping depending largely upon anatomical arrangement, and the influence one group has upon another in modifying its activities; (3) the reactions of the system taken as a whole. It is to the first head that I confine this paper, treating briefly its morphology, physiology and pathology, following the work of Golgi, Cajal, His Waldeyer, Berkely, and others.

THE NEURON.

Morphology.—The origin of the elements of the nervous system is in the germinal cells of the epiblast of the embryo. They increase rapidly, and after division one daughter cell remains as a germinal cell, the others moving from their place of origin, becoming migratory and probably have amœboid movements. The young nerve cells soon lose their spherical shape, and a protusion takes place at some point on their periphery, the cell becomes pyriform in shape, the prolongation grows, and we have the second division of the unit and its only real differentiation, the AXON, which gives off branches called collaterals. The axon and its collaterals terminate in free extremities, called endtufts, not in a network and are not in continuity with other axons or neurons; these axons are the so-called nerve fibers. The neuron gives off other processes, but they are not differentiated as is the axon, but are protoplasmic, coming off from base of apex of the neurocyte, and designated accordingly. These protoplasmic processes are called Dendrons, having upon them, as they divide, buds called Gemmulæ. This is then briefly the modern physiological nerve unit, structurally inde-

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pendent of every other unit, and which, as a whole, forms the nervous system.

The nerve cell itself is usually ovoid in shape, from 10 to 100 mm. in diameter, a few cells of the spinal cord being larger. According to Nissl, there are two substances in the composition of the cell body, which act differently to a basic aniline dye, the one part, not stainable, forming a frame-work or network, probably continuous with the fibrillæ of the nerve fiber, holding in its meshes the stainable nerve cell substance; this nerve cell substance is very sensitive. The nucleus of the nerve cell is not in proportion to the size of the cell—the larger the cell the smaller the nucleus. The nerve cell in animals as in man do not decrease in size in proportion to the size of the animal, being maintained, as body size decreases, at a relatively much larger size. In growth and development the nerve cell presents interesting characteristics. From the columnar epiblastic element they appear in man at about the third week of fœtal life, and divide rapidly; the formation of neuroblasts becomes slow and unimportant after the third month of fœtal life. Having amœboid movements, it is a matter of great wonder that they arrange themselves into so accurate and complex a system, under such complicated directing influences, mechanical strain, and nutritive attraction.

Very early in the development of the cell there appears a fixed point on the body of the cell, from which the axon is to grow, or the cell is polarized, and in maturing the cell undergoes changes in the following order: axon, dendrons, medullation of the axon. The changes occur with greater or less rapidity, often being delayed beyond puberty, and during this process a great increase in the cell substance occurs, and a chemical change in the cytoplasm and nucleus. Some cells never reach maturity.

It is reasonable to suppose that all the branches of the nerve cell had at one time the same physiological powers, and the different functions and structure of the axon and dendron are a matter of selection and environment.

The axon early polarized in the cell is its most important branch, peculiar because no other cell body sends off so long a

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branch or prolongation, extending as it does from cells in the cerebral cortext to the lumbar region (60cm) and from the lumbar enlargement to the skin of the foot (100cm).

The nerve impulse has been shown to pass through the axon. The classification into pyramidal and spinal ganglion cells is a classification from axons, the former having both axons and dendrons, the latter being simply axonic, in which the nerve current passes in and out through the axon. In its course after leaving the cell body, the axon according to its divisions may classify the cell, giving rise to what are known as Golgis' first and second type of cells; in the first type the axon proceeds as the axis cylinder of a nerve fiber, preserving its character unchanged; in the second type it breakes up into numerous branches after leaving the nerve cell. The former type, the pyramidal cells of the cerebral cortex, are the most frequent, while the latter are relatively few, and are found in the cerebellum. The axon branches and ends in the manner mentioned before. After the production of the branches of the axon, the next step is the formation of a medullary sheath. All axons do not have a medullary sheath, nor is any axon completely medullated. In the sympathetic system there are many unmedullated fibers. We do not know much about the significance of this sheath. Two theories are advanced; one that it is to insulate the nerve impulse, the other, that it is nutritive, the latter being more in favor.

The other branches of the nerve cell are protoplasmic processes, and are called Dendrons from their tree-like branchings; they divide dichotomously at frequent intervals.

The pyramidal cells of the cerebral cortex, and very many of the irregular and angular ones have, coming off from the dendrons, latteral buds called gemmulæ, near the basal end being mere roughenings; higher up they lengthen into bead-like processes. The branches of the nerve cells have also varicosities, as a rule, only upon the finer branchings. In this description of the neuron, we have divided it into cell, axon, collaterals and endtufts, dendron and gemmulæ; morphologically and physiologically there are but two parts, namely, the nerve cell and the axon with its end tufts, the dendrons, gem-

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mulæ and varicosities being part of the cell, while the axon, with its collaterals and endtufts, is a differentiated part of the cell body, this differentiation taking place very early in the growth and development of the nerve cell.

The dendrons and protrusions of the cell body are thick, decrease in caliber, divide dichotomously, and terminate with free ends pointed or knobbed. The axons, though their thickness bears a relation to their length, maintain a very uniform caliber, their collaterals are histologically the same as the axons; they are ensheathed and remain so till they end free; the end tufts are free of covering.

The neurons, while structurally independent, are in relation to one another in various ways, and the complexity of the nervous system depends upon these relations, no one part being either topographically or functionally without relation to every other part.

The axons, collaterals and their endtufts of one neuron are in contiguity with other neurons in various ways. The endtufts of an axon of a motor cell of the cord may end free in the periphery, that is, in a muscle. The endtuft of one neuron may be in relation to the cell body of another neuron, or of two neurons. The endtufts of one neuron may be in relation with the protoplasmic processes (dendrons) of another neuron, and other dendrons of the latter neuron, and still other neurons, by these various relations, various tracks, pathways and orders are established throughout the system.

PHYSIOLOGY.—The most important function of the neuron is nutrition. The nutritive material comes directly from the blood, and is taken up by the lymph spaces that pervade the entire nervous system. It is fairly proven that the cell body and dendrons are actively concerned in the absorption of this material. The nutrition of the axon is accomplished during its course, at the constrictions or nodes of Ranvier.

The trophic influence of the nerve cell over the nerve fiber has long been recognized, and the doctrine of the unity of the neuron makes it more easy of comprehension, and it will ultimately be explained. One part of the neuron cannot be injured without its effect on the whole unit. Degeneration of the axon

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(Wallerian) occurs on its separation from the neurocyte, and late investigations prove a change in the neurocyte also. This change has been studied in the spinal cord nerve cells (motor neurons) after amputatian of the extremities. As to the nervous functions of the neuron, it is a serviceable hypothesis to say that all nervous function is reflex in a certain sense; that the nerve cell itself is not capable of engendering nervous manifestations, but that the nervous energy is the resultant of external force on the cell or cells, whether it be in the immediate vicinity of the neuron, or external to the animal itself.

The nerve cell and its dendrons receive the nerve impulses, as well as serving as the nutritives of the neuron. The end-tufts of the axon, in relation to the nerve cell, or dendron, convey the impulse to the dendrons and cell, whence it is sent by the axon to other cells and organs of the body. Certain fine fibrils have been described by some physiologists as coming off from the nerve cell, near the axon, and called axo-dendrons, said to convey impulses and be especially concerned in so-called reflex activity.

Before leaving the physiology of the neuron, a theory founded upon the migratory habit of the developing nerve cell, and its ameboid movements, and the cellular protoplasmic origin of the dendrons, advanced by Duval, Dercum and others, to explain sleep, the hypnotic state is worthy of mention. It contends that the neuron is not a fixed physiological element; that it is capable of extension and retraction at least of its terminals; that the active state is the fully expanded state, the retracted the resting.

Pathology.—With the neuron as the physiological unit of the nervous system, pathological histology has much to hope for. Thus far it has been demonstrated that the protoplasmic processes are the first to suffer, and later the cell itself. No distinctive changes characteristic of a special disease have as yet been discovered. The dendrons become first affected, swellings and tumefactions occur, then the gemmulæ disappear, then the dendrons, and finally the cell itself is altered.

So-called system diseases of the nervous system are now shown to be diseases of allied neurons. The degenerations

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which ceased in various parts of the system so mysteriously are now explained, when the continuity of the nerve fibers is no longer insisted upon. The peripheral neuritis from toxic agents is made plain. How beautifully the gradual alteration of the gemmulæ of the dendrons explain the confusion of thought, the want of co-ordination, the paralytic phenomena of toxic and diseased conditions.

The above histology and physiology of the nervous system opens a wide field of hypothesis to explain the action of remedies, when we consider the impulse generated by them in the protoplasmic processes of one cell, and the widely different impulse induced in another cell with which it may be in relation; to explain the etiology of disease which alters the nutritive processes of the neuron; the functionable troubles where a certain instability of the cell appears to be the cause of the symptoms; the toxic causes, specific or others, that find their most permanent alteration in the nervous system; the effect of heredity upon the brain and nerve power, and that difference of capacity in individuals, which could not be explained under the former conception of this system, and which now seems plain as we look upon it as a more intimate relation among the neurons, than as a question of size or quantity of mere nerve matter; the number and relation of neurons being greater as we advance in the scale of life.

DISCUSSION.

Dr. W. H. Faulds.—This is certainly an age of theories, inventions and great discoveries. A theory regarding electricity which perhaps has not yet reached the great centres of scientific knowledge, is that instead of electricity having a continuous and current like action, this mysterious something is made up of numberless minute orbs, one playing against the other, and thus producing force, heat and light, the latter being similar in appearance to that of the great luminary which is the centre and attractive force of our solar system. Akin or analogous to this would seem to be the teachings of the essayist, who has given us what he very properly calls the Modern Conception of the Nervous System. For, instead of regarding the brain as the centre of life and action, from which nerve force or fluid is sent along nerve fiber to ganglia of lesser impor-

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tance, and from these distributed to every organ and tissue of the human body, we are confronted by a theory that the whole nervous system may be resolved into original or elementary neurons, each independent of the other, each sustaining an independent existence, each in turn acting upon one another, each receiving impressions which the others do not, except by induction, each capable of being acted upon by poisons from within or without, each transmitting to his neighbor, to a certain degree, the effects of the poison, but with a different result. In a word, each cell maintaining a separate existence, acting independently, each being the unit of a system homogeneous in construction, hetrogeneous in function, but in the aggregate a marvel of symmetry and harmonious action—a bundle of neurons which form the basis of that mysterious something which we call life.

We sometimes hear it said that theories are short lived and of little value. But, while this may be true of many theories, the value of a working hypothesis or a logical theory has been demonstrated over and over again. And however much we may object to theoretical teaching, we must admit that it stimulates research, and sometimes leads to greater discoveries than was contemplated in the original theory. Again, this seems to be the method by which we attain the best results and make the most rapid progress. We know that many claim that observation and experience are the best teachers. But experience has shown that even when taking these for our guide, there is danger of falling into error. It is so difficult to observe correctly and to record accurately that few of us have become experts in that line. Hahnemann, in observing the two-fold action of some drugs, believed he could base a system of therapeutics on what is known as the law of similars. And had he recorded his findings, without drawing upon his imagination, the whole scientific world would have applauded his efforts. But when, among other absurdities, he asserted that the potency of a remedy was affected by the manner of shaking the bottle, he was looked upon as a fanatic, and what little of truth there was in his teachings was overshadowed by a veil of superstition that was conspicuously apparent.

We may well ask the question, what would have been the condition of medical science to-day had its teachers abandoned the old methods of thought and investigation and adopted the recording of Hahnemann solely because he claimed that they were the outcome of observation and experience. But to be truthful and impartial, Hahnemann was not an exception in this regard among medical writers of his own or even of our

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day. One need but examine the journals that lie upon his office table to convince him that there is but a grain of truth in very much of the medical literature that is being published. But notwithstanding all this there has never been a period in the history of medicine when there were so many honest, observing, painstaking clinicians as there are to-day; but many of these cannot leave the field of observation and clinical experience. So that for the past twenty years the advance guard in medicine has been led by the theorist, while the clinician has had to do the drudgery necessary to prove the truth or falsity of the theories heaped upon him. However, a working hypothesis, a logical theory, honest investigation and accurate recording of facts have been the potent factors in the progress of scientific medicine in the past quarter of a century. Among its triumphs have been asepsis and antisepsis as applied to surgery and midwifery, the discovery of bacteria as disease producing organisms, serum therapy as practiced in that dread disease, diphtheria, and now comes the discovery of the neuron with a new theory of nerve action, and so promising is the outlook in this direction that an explanation of the phenomena of hypnotism, a better physiology and pathology as well as a more rational basis for our therapeutics are among the possibilities of the near future. Certainly we have cause for congratulation in the rapid advancement of medical science. Also in the fact that we include, in our membership, such an ardent worker, such a painstaking investigator, one who is always in the front ranks with those who are thoroughly posted in everything pertaining to medical science—Dr. Knapp, who has given us such an able presentation of this very modern, instructive and interesting subject.

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OPERATIVE INTERFERENCE IN EPILEPSY.

BY DR. GEORGE W. GUTHRIE, WILKES-BARRE, PA.

READ APRIL 7, 1897.

It has fallen to my lot to have five patients suffering from epilepsy upon whom I have operated. In the following histories the after effects have been traced as carefully as possible, although the three year limit fixed by some authorities has not been reached in all of these cases. I believe it is safe to conclude that every patient has been either cured or afforded relief that fully compensates for the operation.

It was my intention to give a resumé of the experience and results of operations for epilepsy in the fields of gynecology, especially as brought out by a discussion before the College of Physicians of Philadelphia, February 3d, 1897, but circumstances over which I have no control have prevented my doing so. Suffice it to say, however, that operation on the pelvic organs, such as oöphorectomies, hyterectomies, and the like, for the relief of epilepsy, hysteria, and insanity, have, as a rule, been disappointing, and practically have been abandoned. But for the relief of traumatic epilepsy, or the epilepsy due to some lesion following an injury, such as a depressed fracture, an incarcerated nerve, or a painful cicatrix, surgical interference has been followed by the happiest results.

White, in a paper published in the *Annals of Surgery* for August and September, 1891, reports 154 cases upon whom operations were done for epilepsy, 56 by trephining, 30 by ligation of blood-vessels, 10 by castration, 9 by tracheotomy, 24 by removal of the superior cervical gangliæ, 6 by incision of the scalp, and the remainder by such operations as nerve stretching, circumcision, and the like.

A large percentage of cures are claimed for each operation, although in many of them the time after the operation was too short to conclude that the cure was permanent.

My cases are as follows:

CASE I.—*Wm. A.*, age 27 (present age); born in Wales; occupation, driver boy at time of injury; came to America at two years; father living, in good health; mother died four months

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ago of "fits," third attack. First attack came on fourteen years ago after childbirth—six or seven months after. Brothers and sisters healthy. One maternal aunt dropped dead in the street. Was entirely well until the 12th day of May, 1884, at the age of fourteen, when his skull was fractured by a fall, caused by a trestling breaking, he falling with a loaded car. He sustained a compound comminuted fracture of the frontal bone, and possibly involving the parietal of the right side about the line of origin of the temporal muscle. Some detached fragments of bone were removed at the first dressing, and nine months after another piece. Was treated at home.

About four or five years after injury, began to have fits; interval, at first, about two weeks; then oftener, as many as five or six a night, without awaking. Also in daytime would fall from the wagon. After having fits for eight months he came to the Wilkes-Barre City Hospital, March 4th, 1890. At time of admission was having attacks irregularly, sometimes daily, with five or six at night; at other times one in a week or two weeks.

The seat of injury presented a flattened surface, a thick depressed band of cicatricial tissue was attached at the lower anterior margin to a depressed angle of bone. A trepine was applied to this angle and the bony attachment removed. The button of bone was thin and presented no uneven surface underneath. At the same time I loosened the citricial band from its attachment on the other side of the wound.

Patient had a convulsion immediately after the operation, before regaining consciousness from the anæsthetic. His recovery from the operation was prompt and uneventful, and he was discharged March 24th, 1890, nearly three weeks after the operation, without any further seizures.

During the remainder of the year 1890 patient had eight convulsions, and not any since. About ten days after leaving the hospital had one and during the following week six; all in the night. Bandages were still on his head and wounds not completely healed. He then had no more until November of the same year, when one followed a hearty Thanksgiving dinner. Period of immunity six years last November.

CASE 2.—This case was published in the *University Medical Magazine* for June, 1891, by Dr. Walter Lathrop, who was at that time my resident physician in the Wilkes-Barre City Hospital.

"*Robert White*, aged 20; white; born in America; residence Waverly; single, and by occupation a blacksmith. Father and mother died when he was quite young; both had been healthy previous to their last illness. At the age of five years, while

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standing by a well, where some machinery was in motion, he was struck on the back of the head by a windlass. He was taken home unconscious, being confined to the house for some weeks. He did not remember whether his skull was fractured or not. On recovering from the injury, he was perfectly well for nearly two years, when he was suddenly seized with a violent convulsion, lasting some time. He had no more trouble for three weeks, when a second attack occurred, from which he emerged only to pass into a third, and from this to others in rapid succession. The attacks continued to increase in frequency and in severity, with now and then a week or two of freedom. Treatment seemed to give no relief at all; and in the hopes of being benefited, he went to New York and put himself under the care of a specialist, who treated him for nearly a year, not benefiting him beyond giving periodical relief. Getting discouraged, and having used up what means he had, he applied for admission to the hospital in Rochester; this was in 1889, nearly fifteen years after the injury was received.

"While in the hospital the attacks were so violent that he was fastened to the floor, in order to restrain him, and he seemed to get worse each day. He called attention now to the blow he had received years before and asked for an operation. It was refused, and he was informed that the blow *had not* caused his condition, being told that he was incurable. He left the hospital, and drifted about seeking work; he would get employment, only to be dismissed because he had 'fits.' He finally drifted into Wilkes-Barre in 1891, and at the time had not been having many severe attacks.

"In February, after escaping an attack for three weeks, he thought his chances good for getting into this institution, and applied for admission, under the plea of *rheumatism*, of which he presented the symptoms. He was admitted on February 20th, and on the next day he had a severe convulsion, requiring six men to hold him. I gave him inhalations of chloroform, which soon quieted him, but in a few hours he went into another, without warning, and from this to a third, fourth and fifth, horrible to witness. His eyes seemed to start from their sockets, the body would be arched, and then thrown violently backward and forward; severe spasms of legs and arms then followed, while his jaws opened and closed like a steel trap, lacerating his tongue and cheeks. A large amount of chloroform was required to quiet him, but he finally fell into a deep sleep, and awoke ignorant of what had happened. At times he had an aura, but usually no warning of the attack was given.

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"A physical examination showed him to be remarkably sound and of powerful build. The occipital bone was quite prominent, and there was a slight depression just below the junction of the sagittal and lambdoidal sutures. During the ten days following his admission he had from ten to thirty-five attacks every twenty-four hours, the spasms usually following each other in rapid succession, and on several occasions they took place when he was asleep; in one of them he tore a canvas jacket as if it had been made of paper. Large doses of bromide of potash, 300 to 480 grains, were given in twenty-four hours. Then the combination of the bromides of potash, sodium and ammonia, with the fluid extract of ergot, was tried in large amounts, but with little or no effect. The bromides were then stopped, and he was put upon the tincture of veratum viride in doses of ten drops *every hour*. This was kept up for nearly two weeks, and with great success, the spasms being reduced to three in twenty-four hours, and in several days he had only one. His condition was excellent, the pulse being full and strong, and averaging sixty to eighty beats a minute.

"He now called attention, for the first time, to *severe pain* in the back of his head occurring *after* each convulsion, and located in the region where he was injured long ago. He begged for operative interference, and said he preferred death to his present condition.

"On March 14th chloroform was administered and the operation performed by Dr. G. W. Guthrie. A large flap was raised over the site of the old injury and the trephine applied; a button of bone was removed, which showed no marked evidence of an old fracture. Two more buttons were removed, and each showed the same condition. A small drainage tube was inserted and the wound closed. Patient was given morphia, gr. 1-4, hypodermically. He rallied nicely from the operation. The next day he had a slight twitching, but no spasm. The drainage tube was removed in twenty-four hours. On the 16th of March he had three slight spasms, lasting a very short time, and requiring no restraint. No medicine was given after the operation, save one dose of bromide of potassium, 30 grains. On the 18th union was perfect, stitches were removed, and collodion and iodoform applied over line of incision. Temperature has not been above 99 degrees since operation. Patient allowed to get up and go about the wards on the above date (18th).

"On April 4th he was asked to do some light work in his ward; he refused to comply (his gratitude not being sufficient to enable him to appreciate what had been done for him), and

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he was promptly discharged from the hospital. Up to the day of his dismissal he had not a single bad symptom, and said he had not felt so well in ten years. He has probably been benefited greatly, if not entirely cured."

"It is over eight weeks since the operation reported above was peformed, and a few days ago I heard from the man. He has been perfectly well since leaving the hospital, is working hard every day in the lumber regions of New York State, and said he had not felt so well in years. I think there is every reason to believe that he has been cured, and certainly the relief has been marked, considering the length of time he was subject to the attacks. Before leaving the hospital he was shown before the Luzerne County Medical Society, and a brief account of the case was given."

The next heard from White was under date of February 20th, 1892, when Dr. H. D. Wey, physician to the New York State Reformatory at Elmira, N. Y., wrote to Dr. Harvey of this city, saying: "We have here a man known as Wm. Murray (5060), who says that in April, '91, in the Wilkes-Barre Hospital, he was operated upon for epilepsy. Be this as it may, in the parito-occipital region there are evidences that bone has been removed. Will you please inform me, if the hospital records show such a case, and if so, whether the operation was performed for the relief of an epileptic disorder simply, or were the fragments of bone removed as the result of a drunken brawl?"

Dr. Harvey replied, giving the facts as applied to White, to which Dr. Wey wrote, under date of February 24th, 1892, as follows: "Your Robt. White and our Wm. Murray are one and the same person. Under the name of Murray this man was admitted here on the 19th of January, 1892, coming here from Auburn upon a charge of horse stealing. Since he left Wilkes-Barre he had been tramping over the country, gaining his living by his wits rather than by his hands. Upon consulting the biographical register I find that he is an old convict; that he has been in the State Reform School at Rochester, and in the Monroe county penitentiary at Rochester; and besides he has been arrested a number of times upon the charge of vagrancy and confined in various county jails. He is by instinct a tramp.

"In regard to his physical condition he tells me that since his discharge from the Wilkes-Barre hospital he has had but one epileptic seizure, which occurred shortly after his arrest and incarceration in the Auburn jail. The story he tells me is that upon being admitted to the jail, and passing through the hands

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of the barber, in order to have his hair cut, the barber bore down with a comb upon the seat of operation in the occipital region, and harrowed him there to such an extent as to produce a nervous explosion. The fit was a fit of ordinary severity, but soon recovered from, and of which there has been no repetition.

"The man is well nourished, evidently received sufficient to eat, and claims to be in perfect health, except that at times he has a feeling of dizziness. As his maximum period of imprisonment here is five years, the opportunities for watching his progress will be good.

"Trusting the above may be of service to you in allowing of the completion of your records in regard to this man, and with many thanks for your kindness in giving me the desired information, I am, Yours truly,

"H. D. WEY,
Physician N. Y. S. R."

On March 7th, 1897, I wrote Dr. Wey, asking for further information concerning White, giving the name Murray and number 5060, to which Dr. Wey replied, March 14, 1897, as follows:

"Your letter of the 7th inst. was of great service to me in locating and tracing William Murray, 5060.

"I find he was received here from Cayuga county, on January 19, 1892, for horse stealing, with a maximum sentence of five years. Previous to coming here he had been in the State Industrial School for waywardness, and the Rochester Penitentiary for disorderly conduct, &c. The fact that he was operated upon in the Wilkes-Barre hospital for epilepsy appears upon the biographical register. He was an inmate of the Reformatory fourteen months, when he was transferred to Auburn State Prison by reason of his incorrigibility, and the fact that he had previously come in contact with the machinery of the law, as evidenced by his detention in the institutions above named. He was discharged from the Auburn prison on or about September, 1895.

"During the period he was confined here there is no history of his having an epileptic seizure. Certainly he did not in the day time, nor can I find any report of nocturnal seizures. If the latter occurred they would have been noted by the watchman during his frequently repeated rounds of the cell block and reported to me. Briefly, Murray's history of epilepsy while here is negative.

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"He generally passed his examinations in the school of letters with from 75% to 95%, with now and then a failure usually attributed to lack of effort and indifference. In trade school he occasionally slumped in his blacksmithing work for the same reason. At recurring periods he experienced nervous irritability characterized by breaches of discipline and a condition of mind bordering upon insubordination, but never anything approximating an epileptic seizure, masked or otherwise, was noted. I assume his nervous outbursts here were on a line with the state of mind he was in at the Wilkes-Barre hospital at the time he refused to work, and for which he was discharged. The conduct ledger show, during the fourteen months he was here, an inability or disinclination to conform to the discipline of the place. Self interest should have prompted him to hold himself in check for the purpose of gaining short time, but evidently it did not act as an incentive to good behavior.

"I have no knowledge of his history while at Auburn. From the fact that he gained short time there I assume he did fairly well, with no school tasks, and under the influence of tobacco, which is granted and withheld for breaches of discipline.

"Among the records here on file I find a letter from Dr. Henry E. Allison, Superintendent of the Matteawan State Hospital, making inquiry as to William Murray, known here as 5060. From this I infer Murray finally came under Dr. Allison's care as an insane criminal. Dr. Allison is in charge of the State asylum for the criminal insane and the insane criminal. Possibly Murray found his way to some other prison after his discharge from Auburn, and was subsequently transferred to Matteawan. If in his custody, Dr. Allison can give you full particulars as to Murray's condition. In writing Dr. Allison you can refer to me if you desire. Dr. Allison's address is Matteawan State Hospital, Fishkill Landing, N. Y."

Dr. Allison very promptly replied to my inquiries as follows:

"STATE OF NEW YORK,
"MATTEAWAN STATE HOSPITAL.

"H. E. ALLISON, M. D.,
"Medical Superintendent.

"*Fishkill Landing, Mar. 22, 1897.*

"DR. GEO. W. GUTHRIE,
47 South Franklin St., Wilkes-Barre, Pa.

"DEAR DOCTOR: Your letter of the 17th inst. received. Wm. Murray was admitted to this hospital on the 9th day of October, 1894, having been committed from Auburn Prison, to

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which he had been transferred from the Elmira Reformatory. At Auburn he manifested much mental confusion, was destructive of dishes, and entertained delusions of persecution, believing that people were after him with knives, crowbars and ropes. He is said to have had mild attacks of gradually increasing severity, at irregular intervals, previous to his admission. He was disturbed for some time after his admission to this hospital. A few days after his admission he confessed that he feigned insanity to escape from the prison, and stated his confusion of memory and hallucinations of sight and delusions of persecution were all assumed. He manifested, however, a great peculiarity of disposition and imagined that others imposed upon him. He would become excited at trifles, and was nervous, restless and tremulous when engaged in conversation. During the spring and summer he worked upon the farm, having gained about fifty pounds in weight, and his delusions having apparently disappeared. He was transferred to Sing Sing Prison on that date as recovered.

"August 22, 1895, he was again admitted, his delusions of persecution having again revived. His conduct became violent, and he threatened to kill an officer as well as himself. Upon his readmission he stated that the keepers and the physicians wished to kill him, and that they endeavored to break him down by overwork; and, moreover, poison had been put in his food; the other convicts tantalized him and reviled him, or at least he so stated. Soon after his admission he stated that an effort had been made to poison him here, and became excited and restless, profane and threatening. About six weeks after admission this condition had largely disappeared and he was then employed about the grounds. He resumed his old place upon the farm, and soon regained a good condition of general health, becoming cheerful, industrious, and capable of self-control. On the 3d of February, 1896, his sentence having expired, he was discharged and sent to meet his brother at Elmira. There was no evidence of epilepsy in his case while under our custody, nor does any history of any such attacks appear. After his return home, I understand he became addicted to intemperate habits; but with the exception of this fact I have no knowledge of his history subsequent to his discharge from this hospital.

" Respectfully yours, H. E. ALLISON."

CASE 3.—*Jacob G.*, age 36; born in Berks county, Pennsylvania; by occupation, outside foreman at coal works; married 18 years; five children, all healthy. Ancestry good. He is one of a family of eleven children, all living at present and

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healthy. Father and mother both living. No history of any nervous trouble on either father's or mother's side. Habits temperate; never drank to excess; occasionally takes beer, moderately; uses tobacco freely, chewing; smokes moderately; no venereal diseases; never excessive in sexual indulgences.

When he was ten years old he fell out of a wagon, striking the back of his head on a stone, cutting the scalp; wound was a long time in healing, was a "running sore," would heal up and break out again. After healing there remained a painful, sensitive scar which always hurt when touched; was so tender that he couldn't comb over it without pain. Was always perfectly well until about the year 1888, when "spells" came over him, dizziness, couldn't help himself, although he would not lose consciousness entirely. These spells continued for a period of seven years, sometimes at long intervals, a month or longer; later they were more frequent, as many as three a week, and would last from a half hour to two hours. During the attack he would become maniacal, would tear his clothing, break furniture, lacerate his flesh with his teeth, and pull his hair out by the handfulls.

Excitement and heavy lifting would provoke an attack. Stomach and bowels were generally in good order, although attacks of indigestion seemed to serve as an exciting cause to produce an attack. In the winter of 1893 had an attack every day for eight days, and at this time he lay in bed eighteen days.

September 17, 1895, he was admitted to the Wilkes-Barre City Hospital, and the next day the head was shaved and the patient etherized for operation. A scar over an inch in length was found to the left of the median line and back of the vertex. The ordinary horse-shoe shaped flap was raised, including the scar, with the intention of using the trephine. The skull presented such a healthy, normal appearance, there being no evidence whatever of a previous fracture, that I determined to complete the operation by simply excising the painful scar, which was accordingly done. Wound healed promptly and kindly, and patient was discharged September 28th, 1895, after having been in the hospital only eleven days.

At an interview with him March 24th, 1897, he assures me that he has had no fits since leaving the hospital; that during the winter of 1895–6 he suffered greatly from inflammatory rheumatism, confining him to the house for several weeks; that he has worked very hard since the operation; that he has had many kinds of trouble, such as short work, poor pay, in addition to pain from rheumatism; but that no spells have troubled him.

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CASE 4.—*William M.*, aged 47; born in Wales; by occupation, a miner for nearly forty years; married; no history of nervous trouble in ancestory, or his children. A moderate drinker, but would get drunk on pay days. Never had venereal diseases, nor was he given to excessive venery. Married at the age of 21. Has used tobacco, chewing, smoking since boyhood.

When 18 years old was struck in the head by a rock from the premature explosion of a blast. He lay unconscious for about three weeks. After recovering was entirely well until about ten years ago, when he began to have violent headaches at varying intervals.

About seven years ago he began to have minor epileptic attacks. These took the form of short periods of giddiness. If he were talking at the time, he would stop until the attack was over and then take up the sentence where he had left off. These minor attacks became more frequent and more severe, finally merging into the major attacks, which also became more frequent until he would have as many as ten or twelve a week; at no time were the attacks preceded by an aura. At other times he would be entirely free from them for one or two weeks. In addition to the convulsions, he suffered from constant headaches, dull in character most of the time, but at others so intense as to be unbearable and would precipitate a seizure. Another symptom was a marked irritability or crossness of disposition towards his family, so much so that they lived in constant fear of him.

He was admitted to the hospital March 6th, 1896; urine free from albumen. He was free from attacks until the evening of March 10th, when a spasm followed the preparation of his head for operation. After being shaved his head showed many scars, the largest about an inch to the left of the median line and just in front of the coronal suture, covering what appeared to be a depression of the skull. On March 11th the ordinary flap was raised, a trephine applied and two buttons of bone removed, neither of which showed any depression of the inner table; the apparent depression having terminated in the diploë. There were two or three slight hook-like prominences to be felt on the inner surface of the anterior button, but nothing that seemed significant. The wound was treated antiseptically and the recovery from the operation was prompt and uneventful.

The patient remained free from attacks until March 26th, when he had one. About this time he left the hospital.

Nothing was heard from him until April 1st of this year,

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when he was seen by Dr. W. Clive Smith, who made the following note of his condition:

"Patient left the hospital the last of March, 1896. He had one slight 'spell' the day he arrived home; then had none for a period of seven weeks; the longest period he had been free for years. The attacks then reappeared and he has had them off and on ever since; some days having two or three, at other times going two weeks without an attack. He is in good health, much better than before the operation; eats and sleeps well and is able to do a hard day's work. Seizures are not of as long duration nor as severe as before the operation. Patient said that, although he still has the attacks, two symptoms of greater importance to him had been cured by the operation, namely, the severe headaches from which he formerly suffered, and the crossness and irritability of his disposition.

"He has been perfectly free from headache since the operation and he is quiet and kind and gentle as a lamb. This, his wife says, is of more importance than the fits; and they both consider that the two worst symptoms, his headaches and bad temper have been cured and they are perfectly satisfied."

CASE 5.—(This I consider my banner case.)—*John M.*, aged 10; always strong and rugged; very active in all his habits; never had fits in early childhood or infancy during teething or from worms.

Ancestral history fair; father and mother both living; the father suffers from bronchitis and asthma, and the mother is neurasthenic; one paternal uncle is demented.

Some time in June, 1896, patient while running bare-foot cut the sole of his left foot by stepping on a piece of glass, or some other sharp substance. The cut was about the middle of the foot extending obliquely from forward to backward and from without, inward. No much attention was given the cut, he kept running about. It healed very slowly, remaining open several weeks.

About the 4th of July he began to complain of cramps in his foot and leg, and from that date until the middle of September he had frequent attacks, increasing in severity and frequency.

On the 12th of September he had a severe "cramp" in his foot and leg; his jaw dropped; his eyes stared; his muscles became rigid, and he fell to the floor in a fit. His attacks now became markedly convulsive in character and increased greatly, in frequency, until at last he would have from ten to thirty a day, the greater number occurring at night, during sleep. While

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asleep he would rise up in bed during the attacks, become rigid and in a few seconds fall back without awaking, occasionally he would fall out of bed in an attack.

Recalling my experience with the painful scar in the head of Jacob G., No. 3, of this paper, on the 11th of November, 1896, the patient was etherized and with the aid of Dr. W. Clive Smith I dissected out the scar tissue of the old wound, and thinking there might be a foreign body in the foot, I extended the dissection to and through the plantar fascia. Finding nothing I closed the wound, which healed kindly and promptly, but without any relief to the patient. His fits continued as bad as ever, even grew worse.

I found that by pressing upon the new cicatrix I could bring on a convulsion. When pressure was applied in this way the boy would say, "I feel a cramp coming;" his eyes would stare, his face become distorted, his mouth gap open, his whole muscular system become rigid; this condition lasting about thirty seconds, when he was all right again.

A more radical operation was determined upon, and on the 6th day of January, 1897, he was admitted to the hospital and the next day while under ether his foot was reopened; the scars freely dissected out, the plantar fascia divided and the deeper muscular structures explored. A hard nodular mass was felt in the region of the external plantar nerve, about the size of a large pea. One of the assistants exclaimed, "there's your piece of glass," but a more careful examination revealed a knot of cicatricial tissue surrounding the external nerve.

The nerve was carefully dissected from its investing mass without injury. The wound was closed with drainage, and the patient put back in bed. Healing was prompt and satisfactory. He remained in the hospital seventeen days after the operation, during which time he had, as the records show, about 120 attacks, diminishing in frequency and severity towards the end of his stay in the institution. During this time he took from 150 to 200 grains of bromide potassium daily. Towards the last he would have only one or two attacks during the twenty-four hours.

After returning home the bromide was discontinued, the attacks diminished in frequency and severity, as his mother expressed it, "the spells left him as they came," and in a note made by Dr. Smith on April 2d, the following statement occurred: "The last seizure was on February 24th, 1897, since that time, over five weeks, he has been perfectly free from them, in good health, and returned to school in the middle of March."

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I shall not attempt to explain why these results followed, but in cases 1 to 5 I believe the patients required time to recover from the "fit habit" after the cause was removed.

I believe these were, all of them, cases of genuine epilepsy. From the subsequent history of Robert White, No. 2, it would appear that there was considerable "fake" in his make-up, but I cannot believe his epilepsy was of this character. His tongue and cheeks suffered fearful laceration unless protected by a towel held in the mouth during the convulsion. I recall one of the paroxysms I witnessed, while making rounds one day. An orderly, a powerfully built man, lay across his body the stout canvas straight-jacket referred to, which was torn in shreds; one nurse held a towel between his teeth to prevent laceration of his tongue and cheeks; another held the chloroform; soon he was overcome. Imagine a performance like this from ten to thirty times in twenty-four hours.

No. 3 is an honest Pennsylvania German incapable of deception.

No. 4 was relieved of headache and bad temper, and the fits modified in violence. It occurs to me that had I removed three buttons instead of two the result might have been even better.

I think the experience afforded by the above cases warrant me in the determination to operate in every case where epilepsy reasonably appears to be due to the effects of a traumatism, after other means have patiently been tried.

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DISCUSSION ON MEASLES.

APRIL 21, 1897.

DR. C. P. KNAPP.—Not much has been added to our knowledge of measles in the past twenty years. We now recognize it as a dangerous disease, with its complications, ranking third in point of mortality of the acute infectious diseases. We have educated the laity to know that it is a preventable and not a necessary disease of childhood, and thus yearly save many lives. We know nothing of its causation. It is epidemic at times, and in centers of population endemic.

Measles is a highly infectious and contagious disease. It is marked at its onset and before the eruption by a very high range of temperature, 106 and over. The eruption in the mouth will often lead to an early diagnosis. The period of incubation ranges from one to thirty days, the average from known exposures being fourteen days.

The condition of the air passages and alimentary canal, from the local disturbance and efforts of elimination of the toxines, is prone to be easily affected by the bacillus of tuberculosis. Laryngitis of a severe and probably infectious nature is often met with and demands antitoxines and intubation. Albuminuria is common, both as the result of high temperature and toxæmia, and should be guarded against. The medicines I most frequently use are sodium salicylate and ammonia carbonate, with demulcents for the cough.

DR. F. CORSS.—I am not a believer in the wide variability of the period of incubation of measles. In a large number of cases in which the time of exposure was known the period has been from twelve to sixteen days, and where any longer period appeared to be called for I regard it as more probable that an unknown exposure has occurred.

Upholstered railroad cars and ocean steamships, especially the steerage, appear to me to be constant foci of the contagion. Children who have never had the disease, nor been known to have been exposed, are often taken with the malady after a journey by either conveyance. Children just from Europe

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very frequently develop measles soon after reaching Wilkes-Barre. From a familiarity with such new arrivals, I conclude that few who have not had the disease in the old country fail to bring the disease inland with them on their arrival here.

The disease is a systemic poison *sui generis*. It first causes high fever, rapid pulse, and sometimes convulsions. The poison is eliminated through the skin and mucus membranes. The odor is characteristic when the contagion is especially virulent or when it attacks a person in an enfeebled or peculiarly susceptible condition. The lining of the alimentary canal is called upon to do an active part in elimination; hence vomiting and diarrhœa. When the surface of the body is exposed to cold air, or for some undetermined reason the skin fails to do its share of elimination and the rash is scanty and poorly developed, the mucous surfaces are overburdened, and great danger arises that they may fail to do the work without suffering organic lesions of serious import. The mucous surfaces of the head are likely to become highly inflamed and call for careful attention. Suppuration of the external auditory canal frequently occurs with its attendant danger in the mastoid bone. The middle ear may become diseased by the spread of inflammation through the eustachian tube. The conjunctival and schneiderian membrane are also liable to injury. As to treatment and sequelæ, pure vasline, in teaspoonful portions, will generally allay the cough while it is pharyngeal. The mucous surfaces of the head should be frequently sprayed or moppped with hydrogen dioxid and the conjunctivæ should be cleansed with boric acid. When this is done the danger of immediate sequelæ, including suppuration of the lymphatic glands of the neck, is greatly diminished. In pulmonary complication, expectorants should be used with great caution, as they have a tendency to weaken the general vitality already lowered by one disease. A sequel of rare occurrence is croup. This is, I think, generally of the œdematous and not of the membranous variety. Of course diphtheria antitoxin is called for where there is a true exudation, and in general this complication should be treated as is called for by the exigencies of the case.

A more remote sequel of not rare occurrence is albuminuria.

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This is more commonly found in cases in which a severe diarrhœa attended the earlier stages of the complaint. In any case the urine should be tested for albumen frequently during some six weeks after the attack. This form of albuminuria is generally amenable to persistent treatment. I can recall but one case in which I found hyaline casts. That case recovered, but recurring a few years later was fatal. Other sequelæ which I have met are rheumatism, chorea and endocarditis, the treatment of which does not call for special reference.

As to the differential diagnosis between rubeola and rubella, I cannot give any additional remarks to what has already been said. The original view of Dr. Tanner that rubella was a hybrid of measles and scarlet fever, is not now held by the profession; but the idea arose undoubtedly from the character of the rash in a purely typical case. It is half way between the two in appearance; coarser than scarlet fever and finer than measles. Rubella is a catarrhal fever, and in some epidemics reaches a high degree of mortality. The concurrence of the two is common, and is sometimes highly perplexing as regards diagnosis. The present epidemic is less fatal than any previous one which I now recall, but no doubt many cases of remote sequelæ will be met with during the coming summer.

Dr. D. Barney.—We are taught that rubella and rubeola are separate and distinct diseases, each protecting its subjects from subsequent attacks, but not protecting them against each other; and yet it is singular that we find these two diseases going hand in hand in the same general epidemic. A few weeks ago I was called into a famlly of four children to see one of them, a girl of five years, who had an unmistakable attack of measles. The mother informed me that the other ehildren had been sick about two weeks previously with the same symptoms, rash, etc. They were at this time apparently as well as ever. The little girl made an uneventful recovery. About a week after my last visit I was again called, and found the other three children sick with genuine measles. My conclusion was that the first rash noticed by the mother must have been that of rubella.

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The authorities state that pertussis is one of the most common of the diseases accompanying or immediately following measles. In the present epidemic I have found this complication in three different families. The measles were of the usual mild type, the only disagreeable symptom being the persistent and irritating cough, which gradually grew worse as the other symptoms subsided, until it became paroxysmal and was accompanied with vomiting and a discharge of thick ropy mucus —a veritable pertussis.

In one of these families was one of four little girls who had been somewhat troubled with enlarged, spongy-looking tonsils. I had advised the father to paint her tonsils with a dilute solution of tr. iodine for this condition, which was followed by a decided improvement. Although this child has never had whooping cough, and has been sleeping with one of her sisters, and playing constantly with the other two, all of whom have had the disease in a very severe form, she has, as yet, escaped, although several weeks have elapsed since the others have been "whooping." Is it a mere coincidence, or did the dilute tr. iodine have a prophylactic effect?

FRACTURE OF SKULL AND TREATMENT.

BY DR. C. W. PREVOST, PITTSTON, PA.

READ MAY 5, 1897.

Fractures of skull are considered with injuries of the head rather than with other fractures, as the fracture is of much less importance than the injury to the brain and membranes. Any violence sufficient to break the bones of the head is such that if there were no depression the brain itself might suffer severe injury. The treatment therefore must be aimed at the injury of the brain and membranes rather than the skull itself. The fracture may be simple, compound, depressed, non-depressed, comminuted or punctured; may involve only one of the cranial bones or extend to several. They are usually divided into fractures of vault and fractures of base.

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Fractures of the skull are frequently the results of falls, blows from falling bodies, or personal encounters and similar accidents; may have punctured wounds and gun shot wounds producing fracture and doing serious injury to the brain. Fractures extending into nose, pharynx or ear, are compound fractures, more dangerous than those of the vault, as the source of infection is much greater, and they are often overlooked by the surgeon. There are twenty cases on record during the war of the rebellion of fracture of base extending into the nose and pharynx with only one recovery. As a rule fractures of vault are from direct violence and at the point of injury, but there are many exceptions to this rule, as we may have fracture by contre-coup, where the blow is received on one side of the head and produces fracture of the opposite side; this is a rare injury. A person falling, striking the vault of skull on soft ground, may produce extensive fracture of base, or striking on feet or buttock, and the force transmitted through the spinal column. Another fracture, often produced by a blow on the angle of lower jaw, resulting in a compound comminuted or impacted fracture of base. Age should be considered in diagnosis, as fractures of skull are very rare in early youth owing to the elasticity of bones and sutures before they are thoroughly ossified.

Fractures usually extend through the entire thickness of the bone, but the inner or outer table alone may suffer injury. A fissured fracture, if it be compound, may be recognized by a dark line of blood which cannot be sponged away. If it be simple you may be able to elicit a cracked-pot sound on percussion. Fracture of inner table can only be suspected. Simple fractures usually unite by bone; compound with loss of bone, unite with fibrous tissue.

The prognosis should be very guarded in all injuries of the skull, as slight wounds are more apt to become infected and produce serious trouble. (I wish to qualify that statement.) The wound itself is no more apt to be infected, but the drainage is usually less, and the surgeon may not use the same precaution he would in a more serious case, to prevent sepsis. We should never slight any wound of the skull, however tri-

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fling it may seem to us, or on the other hand, we should never dispair of any injury even with a loss of a large amount of brain tissue and extensive laceration of membranes. The dangers of fracture of skull are: 1st, *immediate* (brain injury and septic inflammation); 2d, *distant*, (epilepsy, insanity and persistent headache) which are worse than death.

TREATMENT, 1ST VAULT.—A simple fracture without depression and no brain symptoms is treated expectantly—by rest, low diet, purgation, diuretics, cold to head, and arterial sedatives. A simple fracture with moderate depression, no brain symptoms, or brain symptoms abating, is treated expectantly. A simple fracture with marked depression, brain symptoms absent; immediately trephine and elevate the depressed bone (this is called preventive trephining), and may prevent dis astrous consequences. In all compound fractures shave and asepticise the entire scalp. Enlarge the incision and explore the bone; if fissure exists with hair or other foreign body in it, in order to effect removal and secure asepsis the outer table of the skull should be cut away with a chisel or osteotome, and the fissure converted into a broad groove. In compound fracture or *comminuted* with much depression, trephine, elevate and irrigate wound with warm sterilized water.

Dr. Keen says, in any punctured wound of brain or (punctured fracture) always trephine open dura and disinfect, or in any case of fracture of vault where trephining has been performed, do not hesitate to incise the dura and examine the brain if there is any evidence of injury. Fractures of base may complicate the anterior, middle or posterior fossa, or extend to more than one. If in the anterior fossa, blood may run from nose, pharynx, or after a day or two, appear under the conjunctiva. May be a discharge of cerebro-spinal fluid from nose, pharynx or ear. The discharge of blood being due to laceration of mucous membrane and vessels of dura.

Treves says, cerebro-spinal fluid escapes only when the mucous membrane, dura, and arachnoid are all lacerated. In lesions of middle fossa, blood flows from the ear through a tear in the tympanic membrane or into the pharynx through the eustachian tube; there may be a discharge of cerebro-spinal fluid in these

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cavities. In lesions of posterior fossa, blood or cerebro-spinal fluid may accumulate beneath the deep fascia and produce a discoloration in line of posterior auricular artery, making its appearance first at or near the tip of the mastoid process. There may be paralysis of the cranial nerves and optic neuritis may develop after first week. Temperature during shock, usually sub-normal, may rise to 100 or 101, falls again to normal or a little below normal, unless there is inflammation or sepsis. Should there be any sudden rise of temperature we should suspect serious trouble, such as septic meningitis. Should always collect the fluid that discharges from any of the three fossa so it may be examined to see if it be blood or cerebro spinal fluid.

The prognosis of fracture of the base of the skull was always grave until late years, as the points where infection may take place are hidden and were overlooked. In the past few years antiseptic and aseptic surgery has made such injuries more amenable to treatment and their danger is greatly reduced.

TREATMENT OF FRACTURE OF BASE.—Thoroughly disinfect any cavity involved, wash out ear with warm bichloride solution 1-3000, turn head so solution will run from ear and not pass down the eustachian tube, and pack with iodoform gauze.

Fracture involving nose or pharynx: wash out with hot water, normal salt solution, hydrogen dioxide and boracic acid solution, and insufflate with powder of boracic acid and iodoform, iatrol, acetanilid, and pack nose with iodoform gauze.

In very extensive fractures of base, besides using the above methods, the entire scalp should be shaved and a plaster cap applied to immobilize the parts. The patient must be kept in a quiet, dark room, low diet, careful attention to bowels and bladder, sleep being secured if possible. Treat by drugs—combat symptoms as they arise.

To sum up the treatment of fractures of the vault, either simple or compound, in which there are brain symptoms and depression, incise the scalp and trephine. If no brain symptoms but marked depression, from which we might suspect either immediate or remote consequences, trephine and elevate. In all cases of punctured fracture the rule is absolute to tre-

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phine, open dura and disinfect. In simple fracture, no decided depression, no brain symptoms, the expectant plan of treatment may be pursued, but if compound it must be carefully disinfected as described.

In eighty-one cases reported in Keen's Text Book of Surgery of compound fracture treated as above described by primary trephining the mortality was 1.23 %, while twelve cases treated secondarily the mortality was 33.5 % ; that is, later operation made the mortality thirty times as great as primary operation.

CASE I.—*Peter G.*, German ; age, 38 ; barber ; was picked up by policeman at 4 A. M. in an unconscious condition ; no history of accident ; large contusion over superior margin of frontal bone, a little to the right of median line ; removed to his home and three days later admitted to hospital. On admission, temp., 100.2 ; pulse, 52 ; was delirious ; no paralysis, pupils equal, glassy stare of eyes and general irritable condition. Shaved the scalp and could find no injury except contusion in frontal region ; could detect no depression. The swelling was so great and man so irritable could accomplish nothing by percussion.

Treatment.—Applied ice cap, milk diet, bowels opened by enema, calomel and Dover's powders and bromides.

Two days later condition not improved ; could not recognize family or friends ; violently delirious ; consultation of medical staff, and advised operation, as there appeared some trouble in the *sensorium*. A circular flap made at the point of injury, and on elevating scalp found a linear fracture of skull extending from one inch above the right eye to vertex on left, crossing median sinus ; length of fracture, 6½ inches.

Removed a button from frontal bone about 2½ inches above right eye, and 1 inch from median sinus. The membranes were intact and no depression of internal table ; hemorrhage profuse ; with some difficulty it was stopped by hot water and packing. On following day gauze removed, man's condition less irritable, and in a few days the man began to recognize family and friends. There was some sloughing of scalp and a little necrosis of bone. The man made a good recovery.

Saw patient April 27th, 1897 ; wound healed and covered entirely by hair. The man tells me his general health has been very good since operation, no headache or dizziness, and is able to follow his trade.

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CASE 2.—*M. H.*, female; age 20; fell from street car; brought to hospital in an unconscious condition; no paralysis; pupils equal. On shouting to patient she could be roused a little but could give no account of accident. On examination found blood oozing from ear and patient vomited some blood. Diag. fracture of base of skull complicating middle fossa.

Treatment.—Ear thoroughly disinfected with bichloride 1.3000, mouth washed out with borac acid solution, hydrogen, iodoform, and boracic acid insufflated. Patient lay in a semi-comatose condition for eight or ten days. Temperature normal or sub-normal, pulse and respirations slow. Gave family a grave prognosis.

Treatment.—Shaved large portion of scalp, applied ice cap, gave bromides, colomel and Dover's powders, bowels moved by enema, low diet, bed removed to corner of ward and darkened by screens; complained of pain and would not turn in bed without the aid of nurse for some days. After about ten days the patient began to rouse up some, complained of being dizzy and pain in head, was very nervous.

Discharged from hospital on the forty-first day, with promise she would go home and remain quiet for some time. Heard from patient May 3, 1897; said she had been very well since leaving hospital in October, 1895; never any headache or nervous symptoms; has some pain in back.

CASE 3.—*A. S.*, Polish; age about 22; fell from excursion train. On admission to hospital was very drunk and delirious. On examination found a compound depressed fracture in anterior parietal region. Etherized patient, shaved scalp, made large flap over depressed portion of bone, trephined and elevated skull; found membranes intact. Had much trouble in stopping hemorrhage from diploe of skull, used hot water and finally plugged with match stick. On following day found man walking around ward. He was ordered to bed, opened flap and removed match stick, no more hemorrhage, closed wound and man was discharged from wards in fifteen days, cured.

CASE 4.—*J. S.*, age 43; German; admitted to hospital October, 1895; injured by fall of coal. Examination found in left parietal region about 2 inches above and 1½ inches posterior of left ear a lacerated wound of scalp and small fracture of external table of skull. No brain symptoms, no depression; removed small pieces of bone and the internal table did not seem depressed. Thoroughly disinfected and closed wound. Man also had a dislocation of femur on dorsum of ilium. Luxation

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reduced under ether. Man made an excellent recovery; never had any bad symptoms.

This seemed to me to be a case of punctured fracture and I was undecided whether to trephine or treat expectantly. I cannot find any trace of patient since he left the hospital, forty-three days after the accident. If the man is well and no brain symptoms, expectant treatment was all right.

THE TREATMENT OF PHTHISIS.

BY DR. F. A. FARRELL, KINGSTON, PA.

READ MAY 19, 1897.

The limitation of my subject to the treatment of phthisis leaves still a broad field for discussion. Osler describes phthisis as an infectious disease, caused by the bacillus tuberculosis, the lesions of which are caused by nodular bodies called tubercles, or diffuse infiltrations of tuberculous tissue, which undergo caseation or sclerosis, and may finally ulcerate, and in some situations calcify.

Recognizing the infectious nature of the disease, through the discovery of the specific germ, the tubercle bacilus, by Koch in 1881, and that the predisposition of man to it is very great, since statistics show that one-seventh of all deaths are from this cause, the strictest prophylactic measures should be carried out. The enforcement of such measures by boards of health would be cruel, but physicians should be supplied by their respective health officers with printed rules governing such cases, and through them the family supplied, and educated on how to protect themselves individually, instead of allowing each member to remain deplorably open to the bacillus, by sleeping with the patient, partaking of the same food, using the same dishes, etc., etc. Protection against infection would thus be sustained by each individual of a family in which a case might exist. Such rules for the prevention of tuberculosis can be procured by applying to the Secretary of the Pennsylvania Society, whose office is in Philadelphia.

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The examinations, condemnation and consequent destruction of herds of dairy cattle in the surrounding territory, during the past few months, points out most emphatically the great source of this infectious disease. At no other time in the local medical history has this wide and dangerous channel of tuberculosis been brought so vividly to the mind's eye. Yet, notwithstanding, how little do our people appreciate the advantage offered them against this source. Families should be instructed on this point of infection, and taught to be as careful on it as they are to boil water, to avoid the source of enteric fever, or have their children vaccinated to guard against smallpox. The distribution of such rules, especially if distributed in families infected, would be a step of advancement, and would be appreciated by all intelligent persons. Each member of such a family would attend more carefully to his own personal hygiene, and to the building up of his own constitution, and if possible to isolating himself from the disease on the approach of the first physical sign.

The many forms of treatment, brought out by careful study in the past and dwelt upon as specifics, have failed to meet expectations. Creosote was claimed by William Pepper to be the direct antiseptic method of treatment. Dr. Karl Von Ruck states that creosote is not a specific. The many other forms, such as cod liver oil, hypophosphite syrups, strychnine, guiacol, iron and arsenic have been dismissed by Osler, with the statement that none of these medicinal agents of any character whatever possesses any special or peculiar action upon tubercular processes, and are simply good all-round tonics. Good all-round tonics, however, are very essential to our success, in the treatment of all diseases, and in this one particularly, assisted by careful, personal hygiene. As there are no two cases nor constitutions exactly alike, our treatment must vary accordingly. With a combined treatment of guiacol carbonate and protonuclein, I have had very good results in the case of a lady aged twenty years. When I was first called to her I found her greatly emaciated, weighing only 113 pounds; she had profuse night sweats, high fever and a severe cough. I immediately prescribed for her ten grains of guiacol carbonate, three times

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a day, with a three grain tablet of protonuclien every four hours. She improved remarkably in one week, and at the end of two weeks went to Atlantic City, where she remained three weeks—at the end of which time she was called home by the death of a member of the family from the same disease. She continued the same treatment from the beginning, and now, after two months, the cough has almost entirely ceased, no night sweats or fever, appetite is good, and she has gained twelve pounds. This case, fortunately, was caught in the incipient stage, and the patient complied agreeably to the treatment and isolation. I might say cheerfully, because of the dread of the disease, so manifest in her home at the time.

The scientific experimental study of Koch brought out, first, the treatment of tuberculin, and later the more perfect antiphthisin, which treatments, in some cases, appeared to be specific, but he has not claimed them as such. The antiphthisin he obtained from tuberculin, being made directly from a ten time concentrated culture fluid of tuberculin bacilli. It is administered subcutaneously. In the present state of science it is not unreasonable to suppose that in the near future we may hope to take hold of a case of phthisis with as much confidence as we do to-day a case of diphtheria. The prevention, limitation or restriction of this dreaded disease is perhaps more important than its therapeusis.

DISCUSSION.

Dr. T. A. James.—"Pulmonary Consumption," the most fatal of all diseases, to judge by mortality statistics, yet, as the practitioners of largest experience have always taught, a disease peculiarly amenable to intelligent treatment, attracts the largest share of attention in the study of tuberculosis. Is pulmonary phthisis always tuberculosis? I do not feel that this is the case. J. Solis Cohen is decided in his teaching that there is a chronic as well as an acute consumption that is not originally tuberculosis. Da Costa's recognition of a "non-tubercular form," it is true, is stated only as a qualification, but it is none the less distinct. We believe with Rush, that "pulmonary consumption is a disease of the whole system," and that "the tubercles are the result of the disease, not its cause." Also, the striking assertion of Graves, that many

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would die of phthisis even supposing they had no such organ as the lung.

Without attempt to discriminate between tuberculosis and non-tubercular phthisis, let us look at the divisions based upon the tendencies of the morbid process to limitation in time or in space.

First, then, is that process with little or no tendency to limitation beginning with apparent acuteness often as the immediate sequal to an inflammatory affection of some portion of the respiratory tract.

The next process is that which exhibits "tendency to limitation in time, but not in space." There are many recoveries from the acute attack, leaving, of course, more or less badly damaged lungs. In both of these varieties the tendency to rapid extension of lesions is the indication that must guide therapy.

The question of the possibility of bringing about recovery is a question of power (1) to bring up the vital forces to the point of resistance, (2) to calm the nervous system in order to reduce the combustion of fever, and the morbid reproduction of non-viable cells, (3) to modify the morbid energy or divert it from the lung by reflex impression; (4) to avert and combat toxæmia.

Despite all we can do, some of these cases, forming the group of "galloping consumption," progress more or less steadily to the fatal termination. Other cases soon give evidence of amenability to treatment. The fever gradually, though somewhat irregularly, and with alarming recrudescences, subsides; the sweats cease; the cough mitigates, the restlessness disappears; paroxysms of dyspnœa become less and less frequent; strength and appetite return; the violence of local destruction is arrested; and dry tubular or cavernous breaking indicates that the extension of the acute processes has been checked.

Nevertheless, I hope that even this may not be beyond attainment in the progress of science.

DR. H. HAKES.—The paper just read by our brother contains little that is novel, nor is the essayist chargeable with any short-coming therefor. There is no physician, unacquainted with the symptoms and progress of this awful scourge of our race. Nor can much be said that is novel as to its treatment. The specifics so anxiously sought for through hundreds of years, have yet to be discovered. I do not concede the claim of the essayist, that consumption is so enormously infectious or contagious—nor, that the recent discovery of tuberculosis in

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dairy cows, has proven that a common source of human infection, proceeds from the cows. Certainly, the symptoms, progress and termination, of the disease in cattle, is so different from mankind, that no conclusion is warranted, that mankind derive phthisis from milk, any more than that cows are infected by consumptive human beings. The cases are very rare (but not entirely unknown) where human beings are infected by the diseases of animals. But, on the other hand, we have little or no knowledge of animals being infected by the diseases of human beings. In determining whether cows' milk, butter or cheese are vehicles for a common infection of mankind with consumption, we must remember that other interests and financial reasons urge the committal of physicians in favor of that view. Let us not be deceived in this matter, for milk dealers and dairymen, in a contest with one another, in their competition for dollars, are as sure to have their judgments warped to their own selfish interests, as United States Senators are squinted in vision, when "sugar schedules" are the subject of legislation.

Water and ice companies not infrequently raise a similar rumpus, to the terror of the ignorant, and much desire the endorsement of the medical profession in support of their selfish ends. To consider cows' milk, or the recent claim of the universal permeation of the residue dust of consumption sputa, to be common sources for the production of consumption, it would seem impossible that any member of the human family could now be enjoying a living existence.

No, gentlemen. The germ theory of disease contains some truth, possibly much truth, but more is claimed for it than a just criticism can allow. Facts, partly proved, only suspected, are seized upon from which to formulate wild theories, whereon wilder imagination proceeds to construct theories of treatment that utterly disappoint us in practice.

Consumption has been the terror of the world, and has claimed probably more victims than any other disease. While it is far from my idea that consumption is entirely non-contagious or non-infective, I feel very certain that it is frequently a transmitted disease; nor do I see any reason why, under favorable situations as regards weather, exposures, insufficient and improper clothing and diet, rigorous labor, and vitiated and impure air and repeated pneumonias, it may not be generated and kill. It is emphatically a disease of poverty and dirt, where all the vital forces are reduced. It is not as frequent or so fatal a disease as formerly. As mankind become acquainted with the laws of hygiene, with the improved conditions for health and comfort, the disease must retreat from the presence

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of enlightened society. To believe a tithe of the claims made for the germ theory of disease, might almost tempt us to reject God's providence and deny his goodness in placing in our every path and every touch, in food and drink, and air, inevitable and unavoidable death. As to treatment, tonics are first and last in order, which, with the proverbial courage and surpassing hope of such patients, with the best adapted food and improved sanitation, supplemented with such change of locality to obtain the quality of air best adapted to the patient's respiration that can be found, must for the present, constitute our treatment. That many cases, and some of them apparently quite hopeless, are cured, I think we may positively assert. I can well remember when a physician was rarely called to treat a person, who in the homely and expressive phrase of the friends and neighbors, had "*gone into a decline.*" It meant that consumption had made an inroad, and the person was doomed, past help or hope. Those were the days for the quacks' harvest. The main and slender reliance of thousands of patients was in those huge bottles of useless and mainly harmless stuff advertised to cure *coughs*, *colds* and *consumption!* price, one dollar per bottle. Come again, early and often, and send all your afflicted friends and neighbors. I must ask the essayist, what kind of digestion is possible in the presence of creosote or cod liver oil? The first is a rank poison, and all I will say of the latter is, that like asafœtida, salisylic acid, &c., it is very nasty, stinking, offensive stuff. There certainly are some drugs more offensive if not more dangerous than the diseases they are given to cure. It is an old superstition not yet eradicated, that medicines to be powerful and potent, must of necessity be offensive, nasty and disagreeable.

While the lungs are the organs usually selected for the destructive operations of phthisis, yet they are not exclusively so. Nor must we regard phthisis as a local disease. In it is a disposition of vitiated blood, producing tubercle, instead of healthy bone, muscle and viscera. The disease permeates or exists in every drop of blood. While we cannot say why the blood is thus disposed to produce tubercle, we well know the other conditions that favor the development of the disease. Surely the production of usual healthy blood, from healthy diet and sanitary surroundings, must be unfavorable to the development or destructive process of consumption.

DR. BARNEY.—Several years ago I was asked by a man living in this city to see his sister-in-law who was said to have consumption. There seemed to be some doubt in the minds of the family as to whether the disease was consumption or not.

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I found the woman decidedly in the last stages of phthisis, and later I learned that she succumbed to it in about six weeks from that time. The different members of the family had been in the habit of caring for the patient—one of them sleeping in the same bed—washing her clothing, etc., especially the cloths into which she expectorated. At the time of my visit all the other members of this family seemed to be in perfect health. Since that time, not only has the original patient died, but she has been followed by her sister and brother-in-law and two of the children of the latter, all of consumption.

MASTOID DISEASE FOLLOWED BY SINUS THROMBOSIS, MENINGITIS, AND DEATH.

BY LEWIS H. TAYLOR, M. D., WILKES-BARRE, PA.

READ MAY 19, 1897.

It is a great pleasure to be able to report, in a meeting like this, the results of a brilliant operation, which has been followed by a speedy cure and the removal of the troublesome and complex symptoms which annoyed the patient and made his life a burden. It is the duty of every physician to report such cases for the encouragement and guide of his fellows. It is no less the duty, though far from the pleasure, of the conscientious practitioner to report also those cases which have ended disastrously, in order that they may serve as a warning to others, or that a careful consideration of them and honest criticism may point the way to better success in the future.

It is in such a spirit that I report to you the following case, which started as an ordinary otitis media, which was treated as numerous others have been; which nevertheless developed mastoid disease, which was operated upon first by Wilde's incision, later by a thorough opening of the mastoid cells; which ran a course giving every promise of recovery but which suddenly developed symptoms of meningitis and brain abscess; was trephined without such abscess being found and died from sinus thrombosis and septic meningitis.

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F. A., aet 43, came under observation October 22, 1895. At this time hearing distance for watch R. E contact; L. E. two feet. He stated that R. E. had been sore about three weeks. It is quite painful at times and discharges pus. I carefully cleansed by syringing; used spray of Dobell to nose and throat and inflated the right side with the eustachian catheter. I dusted in boracic acid powder and gave cinchonidine sulph. gr. v., t. d.

October 25. Much better as to pain. Ear is discharging a little. Same treatment.

October 29. He had considerable pain on 26th and 27th, but since then he is better. Now no pain and is feeling much better in every way. Spray and catheter. Strych. sulph. tablets gr. one-twentieth t. d.

November 20. Almost a month after first visit; there is no more pain or discharge, but he is troubled with noise in the head so that his sleep is disturbed. Hears watch on contact only. Spray and catheter. Tablets, "Neuralgic Improved," for pain in side of head.

December 1, 1895. Now R. E. is discharging again. He says it commenced on November 29. Same treatment.

December 11. Pain and redness over mastoid. Leeches and morphia for pain. Hot applications.

December 13. Dr. Buckman gave chloroform at his home as he was no longer able to come to the office, and made an incision over mastoid and applied poultices.

December 16. Pain in head continued till this morning. No discharge from the incision.

December 19. To-day he comes again to the office. Now taking cinchonidine sulph. for two days and has had no pain, but he cannot sleep and has no appetite. Tongue heavily coated. No discharge from the ear but the cut over mastoid is now discharging. R. HgCl, $\overline{3}^{ss}$; sulpho-carb. soda, $\overline{3}\dot{\uparrow}$; sacch. lactis, $\overline{3}\ddot{\uparrow}$; a pinch on tongue every half hour. Neurosine every three hours.

December 22, 1895. Patient seen at his home again to-day. He had much pain last night. I opened the cut again and much pus discharged from the posterior part of the mastoid. As his condition was now very bad, and the attendance at his home very unsatisfactory, I advised his removal to the hospital. This was done two days later, and on December 24, after dissecting away the soft parts, I chiseled into the mastoid and found outer plate very thick, but pus was finally found nearly an inch back of the ear. The original point of discharge was at the extreme posterior portion of the mastoid. I cut away

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the bridge of bone between the two and opened the cavities freely. After thorough cleansing, the wound was packed with iodoform gauze.

Notwithstanding the unfavorable condition at the time of operation the patient did exceedingly well for ten days, the temperature not rising above 99 degrees, and I was confidently expecting to discharge him in a few days.

Suddenly, on January 4, 1896, the temperature went up to 103; on the 5th it fell to 100; on the 6th rose again to 104, and he was now very restless, and complained greatly of pain in his head. Semi-conscious. Fearing a brain abscess had developed and as the case seemed in every way desperate, I operated about midnight of January 6, trephining with a large trephine, at a point 4 ctm. above and 3 ctm. behind the external auditory canal. When the button of bone was removed the membrane seemed to be tensely forced into the opening. A sterilized needle was inserted into the brain in several directions, but no pus was found. The patient died the following evening, January 7.

A partial autopsy only was made. I enlarged the opening and removed the temporal bone. An exploration of the brain as far as it could be made did not reveal any cerebral abscess, but there was decided evidence of meningitis, and on opening the lateral sinus it was found filled with clotted blood. This was the evident cause of death.

The unfortunate termination of what seemed at no time a more serious case than many others similarly treated leads us to the natural inquiry, could this have been avoided? Or what are the legitimate criticisms upon the conduct of the case?

I think it would have been better if the patient had earlier been removed from his home and placed in the hospital where the treatment could have been more intelligently and faithfully carried out.

Secondly, when the Wilde's incision was made on December 13, it would possibly have been better, in view of the subsequent condition, if a thorough opening of the mastoid cells and antrum had then been made. I have, however, treated several similar cases in which the Wilde's incision was followed by speedy subsidence of all troublesome symptoms. During the time that this patient was treated we were treating two other similar cases, the one of which, *J. F.*, aet. 21, was operated upon, under local anæsthesia, with chloride of ethyl, by a

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free Wilde's incision, and made an excellent though tardy recovery; the other, *F. H.*, who came to the office with mastoid trouble lasting eight weeks, and an abscess pointing back of the ear, was operated on by simple incision in the office December 7, 1895, and five days later, under ether, by a more thorough mastoid opening with discharge of large amount of pus. He also made an excellent recovery.

Another criticism that might be made on the above case is, that the ophthalmoscope was not used as an aid to diagnosis. Had this been done it is possible that there might have been indications for earlier operation on the mastoid.

There was, however, in the earlier progress of the case nothing to suggest that it was different from many other cases of otitis media, that had recovered under routine treatment.

On the "Value of the Ophthalmoscope as an aid to Diagnosis of Cerebral Disease in Purulent affections of the Middle Ear," Dr. Thomas Pooley, in the Medical Record of August 15, 1896, makes many valuable suggestions, and says: "The extent to which the presence of slight œdema of the optic disc should influence us in determining upon an operation on the mastoid is, in the absence of other sufficient evidence, an open question. But I think we may safely accept the conclusion of Dr. Andrews, that 'as the operation when intelligently performed is not a dangerous one, without waiting for a pronounced neuritis, we may accept the condition of œdema of the disc as an indication for opening the mastoid, and if not with the expectation of liberating pus, at least to establish free drainage from the middle ear.' That a marked neuritis alone or in connection with other symptoms is an indication to open the mastoid, no doubt can exist. Another point of great value is mentioned by Knapp. It is not necessary to keep up the syringing and drainage from the mastoid cavity until the suppuration has completely ceased, and it is just in these cases that the use of the opthalmoscope has been of advantage."

The possibility of suppuration of the ears being followed by meningitis, brain abscess, or lateral sinus thrombosis should teach us all to give to each case of middle ear inflammation our most careful attention until all danger is past.

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Much has been written in very recent years upon brain abscess of otitic origin, and many operations have been performed in such cases. I quoted a few of these in a former paper. These are not always successful. Dr. Gorham Bacon in the July, 1896, "Archives of Otology," reports a case of acute otitis media followed by an abscess in the tempero-sphenoidal lobe, in which he operated and found pus; the abscess was evacucuted but the patient died apparently from shock two and a half hours after the operation.

D. W. Milligan, of Manchester, in the same journal reports a case of temp. sphenoidal abscess secondary to acute left-sided suppurative middle ear disease. Operation gave at first prospects of a favorable prognosis, but it was followed by hernia cerebri and death.

As to the complications found in the case I have detailed—lateral Sinus Thrombosis—the results of operation are by no means always favorable, though many cases recover. I carefully avoided opening the sinus, though had this accidentally been done it would have probably been no disadvantage.

Chiugini (Annales des Mal del'Or, etc.) quoted in Annals of Oph. and Otol. July, 1896, reports four cases of accidental opening of the lateral sinus in the course of operating upon the mastoid process. Treatment consisted in immediate tamponing with iodoform gauze and sublimate dressing externally. Cure followed without incident in from six to ten weeks.

G. Gradenigo, in the same, reports sixty-eight cases of chronic and acute mastoiditis operated on, twelve of which presented endo-cranial complications (17.6%). The complications were 14.5 extra-dural abscesses, 2 cerebral, 2 cerebellar, 3 thrombi of the sinus, 2 otitic meningitis.

Dr. G. A. Wall, Topeka, Kas., reports a mastoid abscess complicated with lateral sinus thrombosis and diabetes, in which he operated with recovery. The jugular was not tied owing to the age of the patient.

Lucas, in Birmingham Med. Review (Annals Oph. and Otol. July, 1896,) reports a case of lateral sinus thrombosis. Mastoid operation August 8, with slight improvement. On August 12 the sinus was opened, the clot removed and the sinus plug-

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ged with iodoform gauze. The external jugular was tied in two places and divided. The temperature improved but the patient died August 27, from pyæmic infection of the lungs. Lucas believes that he should have diagnosed thrombosis at the beginning and operated at the time of opening the mastoid.

The question of tying the jugular is still unsettled; as many seeming to be in favor of leaving it open as of tying.

These cases are all of interest to us as serving to show that mastoid disease is by no means the simple affair that some would have us believe, and that we are liable to have such cases, even the apparently simple ones, followed by serious brain complications and death. The great lesson to be heeded is, that our cases of ear trouble should be so treated that mastoid complications may be avoided. This is often impossible when we do not see the patient until late in the disease, or do not have full control of him after we do see him.

TRAUMATIC NEUROSIS.

BY DR. D. W. COLLINS, WILKES-BARRE, PA.

READ JUNE 2, 1897.

This subject contains many mooted points, viz: existence or not of the true concussion of the cord; the existence of special class of nervous symptoms following injury and due entirely to it; the existence of major hysteria with anæsthesias and paralyses; the existence and significance of hysterical symptoms of spasmodic character; objective symptoms to test reality of alleged nervous phenomena and malingering. Many of the differences of opinion are due to the fact that the early literature on his subject was from the hands of surgeons, whereas it is now from neurologists. Among the first works on this subject were those of Erichsen, in 1866–1875, upon "Concussion of Spine." Much has been said for and against his work; his teaching of concussion of spine, paralysis due to molecular change in the the cord without structural changes, was probably wrong, as such a condition has no place in the pathology of to-day. While his pathology may have been at fault, his entire work

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should not be scouted on these grounds, as it would be as logical to deny the existence of hysteria without a uterus.

Following this, many works were written on this subject under the names, railway spine, Erichsen's disease, &c., but of late years nearly all the writers use the term "Traumatic Neurosis," and under this heading are included numerous affections, as traumatic hysteria, traumatic neurasthenia, &c. Clevenger of Chicago defines Erichsen's disease to be a serious disturbance of the functions of the cord without demonstrable lesions, the symptoms being all directly due to the original sympathetic system derangement.

The American Text Book of Surgery, after describing relations of cord, says: "It is evident that a traumatism which, without causing some gross lesion, would produce a lesion of the cord justifying the use of the term concussion, must be of rare occurrence, and probably some actual lesion in the substance of cord occurs, as rupture of delicate nerve fibres, possibly a capillary hemorrhage or vaso motor disturbance, with slight serous exudation.

Walton considers it extremely difficult to injure the spinal cord except through the medium of its bony canal, yet admits having seen cases in which there was clinical evidence of such injury, but these cases were not controlled by autopsies. Charcot and the French school hold that shock attending railway and allied accidents simply develop, *not* the ordinary symptoms of a neurotic diathesis such as paralysis agitans, epilepsy, traumatic sclerosis or insanity, *but* always hysteria or neurasthenia, or both combined.

In railway accidents we have two kinds of shock, physical and psychical; the latter is held by Charcot to be akin to the somnambulistic stage of hypnotism. The amount of injury to the nervous system cannot be measured by the intensity of the physical shock, as in many cases the psychical shock is a paramount factor, sufficient to produce serious results. Oppenheim and Strümpell lay chief stress upon the psychical factors as the most important cause.

The prevalent theory of Duret, that the effects are produced by the sudden driving of the cerebro-spinal fluid from subar-

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achnoid space through the foramen Magendie into the fourth ventricle, thence into the central canal of cord and through the aqueduct of Silvius into ventricular cavities, has the fatal objection that the pressure in the intracranial cavity is transmitted in all directions as in a fluid, so the pressure in the ventricles can never be any less than outside the ventricles.

Horsley's theory, based upon experiments in which the blood pressure curve, the respiratory curve, and intracranial tension were simultaneously registered, is that a sudden severe blow upon skull causes an immediate and sudden rise of intracranial tension; in other words, producing an instantaneous and severe compression of the brain. As result of this there is an extreme, though very brief, anæmia of the brain.

Bikelis, after producing traumatic degenerative neuritis in animals, recalls the view of Obersteiner, Leyden and Schmauss, who hold that softening of the cord following traumatism is the direct result of the death of nerve substance produced by the blow, and is not due to the hemorrhage preceding.

Much discussion and debate is still taking place concerning the exact pathology; two views are held—first, that the symptoms are the result of concussion and anæmia of cord, or subsequent organic disease in spinal cord (as spinal meningitis, or meningo-myelitis), the result of such concussion; second, that the symptoms are result of a functional disturbance in the nervous system indicative of traumatic neurosis. From the evidence accumulating it would seem that the former is the more acceptable, however the existence of a preponderating stratum of hysteria or psychosis must be acknowledged, and until the pathological foundation of that state is ascertained there will necessarily be much of the problematical in these discussions. The notion of functional diseases as distinct from organic, that is due to no structural change in the diseased organ, is fast becoming obsolute. While in neurasthenia, hysteria and certain allied affections it still holds sway in many minds.

For years an attempt has been made to refer both hysterical anæsthesias and paralyses to alterations in the blood supply of the affected parts, and especially to vaso-motor disturbances.

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This theory, although not improbable, has little positive evidence in its favor, and so must be regarded as undetermined.

Hodge has found that in normal fatigue the nuclei decrease in size, assume an irregular, jagged outline, stain darker, and lose their reticulated appearance; the cells protoplasm shrinks in size and shows vacuolization in the spinal ganglia or enlargement of the pericellular lymph spaces in the cerebrum and cerebellum, and has lessened power to reduce osmic acid; the nuclei of the cell capsule, where there is a capsule, decrease in size.

Normal fatigue has a close kinship to neurasthenia, and it is not improbable that we may find changes in the nerve cells of a similar or more pronounced character in this affection. There is a great variation in the period at which the more persistent and positive symptoms of spinal lesions are developed—some immediately after injury, others go weeks or months—but this period is generally one of impaired health, full of hysterical symptoms, such as irritability, inability to apply themselves, hypochrondriasis, countenance becomes careworn, memory defective, confusion of thought, business aptitude is lost, restlessness, sleeplessness, &c.

One of the most remarkable phenomena attendant upon these cases is that the sufferer is quite unconcious of any serious injury at the time of accident; generally feels "pretty well shaken up;" congratulates himself; but on reaching home the effects of the injury begin to manifest themselves, usually of the hysterical strain. The symptoms may be divided as follows: 1, psychical sphere; 2, muscular and motor; 3, sensory sphere; 4, visual; 5, vaso motor.

The symptoms of the psychical sphere are mental irritability and depression, lack of attention, lack of power controlling attention, feebleness of memory and weakness of volitional power; associated with these we have sleeplessness, headache, vertigo and paræsthesias of head, including such symptoms as insomnia, headpressure, feelings of constriction and fulness. The muscular and motor symptoms are *tremor*, which is of frequent occurrence, weakened muscular power and wasting of muscles. This does not affect special group, and is often unequal in

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members of same group. Walton says difference in size of limbs never exceeds five-eighths inch, and rarely reaches that extent. Twitching motions of face and slight fibrillary contraction takes place. Dana says says there is no motor or locomotor ataxia, *but* always a considerable degree of *static ataxia*, varying with nervous depression and irritability of patient. Tendon and skin reflexes are as a rule exaggerated.

The sensory symptoms are anæsthesias of skin, diminished cutaneous sensibility, sensitive points (tenderness) along spine, also scalp, particularly over sutures, neuralgic cardiac reaction or Mankopf's symtom. The visual troubles are concentric limitation of field of vision and fatiguability of visual field. Smell is sometimes impaired or abolished, but these are often due to local disorder. Disturbances of taste are common in hysteria, but not in traumatic neurasthenic conditions. Disturbances of hearing, as noises, hyperacusis and sometimes slight deafness. Beginsky has described a deafness occurring in traumatic neurasthenia as due to concussion of labyrinth; it is associated with noises in head and sometimes vertigo. There is as rule no limitation of the field of hearing.

In a large proportion of cases there is evidence of vaso-motor weakness, shown by cold extremities, tendency to perspire easily and excessively. There is evidence in many cases of considerable degree of dermography. There are sometimes local cyanosis and local edematous swellings. Bodily temperatnre may be subnormal. Pulse abnormally frequent; Walton gives averages—male, 90.5; female, 95.75. This is given much stress by Germans, and Oppenheim has noted compensating hypertrophy as result of this. Sometimes patients suffer from polyuria, again condensed urine. There is at times irritability of bladder and tendency to frequent urination. Urine in most cases presents a relative excess of phosphates. In making diagnosis, age, previous health, and condition at time of accident are to be considered.

Most cases occur between the ages of 20 to 50 years; males about 3 to 1; due to fact that more males travel and more exposure to accidents than females. Syphilis, excesses in alcohol or venery, Bright's disease, strain and privation, and other

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causes which tend to develop degenerative changes in central nervous system, are to be considered. Also occupation, as engineers, and possibly cyclists, due to irritation produced by constant vibration.

People asleep or intoxicated, persons accustomed to travel, as old soldiers and commercial travelers, are less liable than others, due partly to the fact that the element of fright and psychical shock are in a measure eliminated, and partly to the relaxed condition of body which renders psychical shock less liable. There are many conflicting opinions regarding the diagnostic significance of various symptoms among neurologists of equal reputation, and this question must still be regarded as *sub judice.*

Gowers is convinced that the patellar reflex is never absent in a healthy person, but only when there is some structural disease of the muscular or nervous system. Zander found that it was not discernable in 1.5 % in 300 cases examined. Others claim that abolition of knee jerk has been so rarely observed that it can be accounted for by its occasional absence in healthy (?) persons. It seems now to be the general opinion that concentric reduction of the visual field and cutaneous disturbances of sensibility properly belong to the hysteriform complex of symptoms. Bruns found contraction of visual field in one-third of his cases, and looks upon this as a typical hysterical symptom.

In America this symptom has been found in but few of the reported cases. Dana says, as a rule, there is no concentric limitation of the field of vision, but there is evidence of a certain amount of fatiguability of the visual field. Insomnia may be regarded as an objective symptom. Emotionality and irritability are in a measure objective. Dana says in traumatic neurasthenia there is no anæsthesia of skin unless complicated by organic injury or presence of some hysterical process. This is at variance with the teachings of the German neurologists, Oppenheim in particular, who lays great stress upon diminished cutaneous sensibility as well as genuine anæsthesia.

Mannkopf's symptom, which is a sudden acceleration of pulse 84-90; 100 to 120 when sensitive points over spine are

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pressed upon. This was first described in 1885. Its presence indicates undue irritability of nerve centers, and it has objective importance, though it does not show existence necessarily of traumatic or other neuroses. Dana says that degenerative reactions are never found where the paralysis is of a functional type, or in hysteria uncomplicated by organic disease. Further, he says there are some electrical changes which, to a certain extent, are characteristic of the neurasthenic state, but these we cannot as yet formulate positively.

Higier concludes that the symptoms which cannot be simulated are concentric reduction of visual field, Rumpf's reaction, diminution of galvanic irritability and Mannkopf's symptom. Hitzig dwells on the harm done by those who deny the existence of these neuroses, and recommends that the presence of hypochrondriasis, neurasthenia, hysteria, or mixed condition be determined, and that the diagnosis not be made wholly on objective symptoms. Sequin holds that a diagnosis without objective symptoms indicating well known lesions be reserved.

Formerly simulation was considered to be of frequent occurrence, whereas it is now considered rare, while exaggeration is seemingly frequent. Booth says simulation and malingering are possible, though rare. Strümpell, Donath, Wernick, Benedict and Schwartz consider simulation and exaggeration frequent. Knapp of Boston, among his fifty cases which he subjected to careful and frequent examinations, found only two cases in which simulation seemed at all probable, and in neither of these was conscious, deliberate simulation proven.

There seems to be less disagreement as to the prognosis and a more encouraging view as to recovery than formerly. In almost all the severe cases in which the patient is claiming compensation the symptoms persist and become worse rather than better so long as he is compelled to suffer the worry and anxiety attending litigation. After the case is settled some recover quickly, others slowly, some never.

Vibert and Erichsen consider prognosis grave, and Oppenheim takes the darkest possible view.

It is difficult to explain the discrepancies in percentage of cures reported by German and American authorities. Here

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it is held, when only the symptoms of nervous disturbance is present, no matter how severe or how helpless the patient may apparently be, we are justified in anticipating a more or less complete return to health in the course of time. There is no special line of treatment, tonics and electricity being the principal agents used. Of recent years nothing new has been suggested as regards medicinal treatment. It is only by analysis of symptoms and careful application of therapeutic measures, specially indicated in each particular case, that success can be assured. Lewis A. Sayre has witnessed in a number of cases with paralysis of long duration (one over two years) a marked improvement after the use of suspension treatment. In many cases when the spine was stretched the patients said they felt better, had more control of limbs, sensation was keener. All cases continued to feel this improvement so long as they were sustained by suitably fitting plaster of paris jackets.

Mr. E. F. S., æt 54, boarded an electric car in one of our suburbs to come to his place of business in this city. Was in a collision; was seated about three feet from front door, against which he was violently thrown and rebounded forcibly into seat. Felt badly shaken up at time, but came to his business, which he attended to during the day. On returning home in evening was taken ill, and was confined to bed for a week, and to house for three weeks, during which time was under care of a physician. About six months later he noticed his right leg bothered him; his limbs became cold, causing him to wear two pair of drawers even in warm weather. He also noticed he could not ascend stairs as well as usual, owing to inability to raise right limb sufficiently, his toe catching the step; later it interfered in his walk. He complained of irritability and inability to apply himself to business, owing to failing memory, and finally gave up business except in lightest form; was annoyed by running water and noise of children at play. Family history, also personal, exceptionally good; one slight attack of rheumatism, local edematous swelling right knee; cutaneous sensibility diminished below level of ribs, normal above this; patellar reflexes greatly diminished; sensitive points over spine did not respond to Mankopf's test; evidence of degenerative

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and traumatic reaction; much static ataxia; special senses uninvolved; temperature not taken; eyes not examined. Although patient received appropriate treatment, and also that which is especially curative in many cases, namely, a money settlement, he has gradually grown worse. Conclusions: psychical shock the most potent cause; traumatic neuroses are a reality; diagnosis should not be made wholly on objective symptoms; imperfect recovery the rule.

PLACENTA PRÆVIA.

BY DR. BOYD DODSON, WILKES-BARRE, PA.

READ JUNE 16, 1897.

Mr. President and Members of the Medical Society:

Placenta Prævia, a subject somewhat commonplace, is nevertheless one of such extreme importance that it is worthy of most careful study. It is one of the most dangerous of obstetrical contingencies, one, which perhaps, next to puerperal eclampsia, excites most anxiety in the mind of the medical attendant. Placenta prævia, also spoken of as ectopic development or vicious insertion of the placenta, is that condition which the placenta presents at parturition, being implanted on the lower segment of the uterus, that portion which always dilates as labor advances.

Some obstetric writers describe four varieties, viz: Placenta prævia centralis, placenta prævia partialis, placenta prævia marginalis, and placenta prævia lateralis. It is as well or better, perhaps, to describe placenta prævia as being either complete or lateral.

By complete placenta prævia will be understood that condition in which the os uteri internum is entirely covered by the placenta, while lateral placenta prævia is that condition where the placenta extends near to or partially covers the internal os.

Most authorities agree that complete placenta prævia is exceedingly rare, the lateral variety being much more frequent.

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There are, however, a few men who claim that complete placenta prævia is more frequently met with than lateral.

As early as 1685 Paul Portal spoke of firm adherences between the placenta and parts contiguous to the mouth of the womb.

In 1709 was given anatomical demonstration of this condition upon the body of a woman who died of uterine hemorrhage.

In 1754 placenta prævia was a recognized condition, Benjamin Pugh recording that "the placenta sometimes loosens before the membranes, which contain the waters, are broken, and by the child's turning itself, it is sometimes found to present at the mouth of the womb previous to the birth of the child."

In 1789 Rigby distinguished between accidental and unavoidable hemorrhage, the former occurring when the placenta was normally situated, the latter "when it is fixed to that part of the womb which always dilates as labor advances."

The frequency of occurrence is variously estimated as 1-1500, 1-1000, 1-750, 1-239.

No age is exempt from it, having been found in a girl of thirteen, and in women at fifty. It is believed to be two or three times more frequent in multiperæ than primiparæ.

Various theories are advanced regarding its causation, chief among which, perhaps, is a diseased condition of the endometrium. Among other reasons advanced may be mentioned previous abortions, subinvolution, relaxation of uterine walls, cancer and myoma, position of patient at time of coitus or fecundation, specific gravity of the ovum, opening of the oviducts in lower segment of the uterus, the jar occasioned by travel on railways, etc.

Hemorrhage occurring in the latter months of pregnancy or at the beginning of labor, at once suggests the probable existance of placenta prævia; it is the one dominant or characteristic symptom. This hemorrhage may occur when the patient is going about her usual household duties, and when subject to no particular exertion, or it may come on when patient is at absolute rest, as when in peaceful slumber. The immediate or exciting cause, however, may be some bodily exertion, such

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as lifting, straining, coughing or sneezing. The time at which the first hemorrhage occurs is variable; it may be as early as the seventh month of pregnancy, or indeed, in some cases, much earlier, or it may be delayed until a few days before labor, even occurring, in some cases, only when labor is fully established. The hemorrhage may be but slight and cause no great alarm or inconvenience, it may last a few moments or a few hours and cease spontaneously, or it may be so profuse, so violent, as to rapidly prove fatal. Most frequently it ceases for a time only to recur at irregular intervals until labor pains, coming on naturally, or induced by artificial means, empty the womb of its contents.

Vaginal examination generally shows a softened condition of the cervix; the presenting part of the child cannot be determined by the finger owing to the thickness of the intervening uterine wall and placenta. Diagnosis is verified and made positive, however, if the examining finger can penetrate the cervical canal by finding the internal os entirely covered by a thick spongy mass where it is complete, or finding both membranes and placental tissue in the lateral or incomplete variety.

The maternal mortality is estimated at 20% to 25%. Winckel claims the mortality should not exceed 5% to 10%; this probably applies only to a well regulated hospital practice. The mortality of the children is greater than that, being estimated at 50% to 75%.

The dangers to the mother do not terminate with the birth of the child; fatal syncope may occur after all hemorrhage has ceased, or the examinations and the means used to control the hemorrhage may lead to infection and the patient perish from sepsis and pyemia.

Having thus briefly reviewed the varieties, history, causation, frequency of occurrence, symptoms, diagnosis and prognosis, what can be said of that question of most practical importance —the treatment?

There is by no means a unanimity of opinion regarding the best method of treating these cases, nor can there be laid down any definite rule for their management which will be found applicable to all.

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Hemorrhage occurring before labor, if not too severe, is treated expectantly, placing the patient in bed, and, if necessary, give opiates to insure rest; but if the loss of blood be great and the cervix rigid, a properly applied tampon is indicated. The length of time it is allowed to remain will vary according to circumstances. Winckel advises, for this condition, the use of vaginal injections of hot water or of hot water and vinegar and also the colpeurynter. If hemorrhage occurs during labor, the os dilated or dilatable, a lateral implantation of the placenta, the child's head presenting, rupture the membranes, when it will be found that the child's head will, by pressure upon the bleeding uterine surface, arrest the hemorrhage and at the same time cause stronger uterine contractions. The case can then be left to nature, or more speedily terminated by the application of instruments. The same is applicable to breech cases, except that it is desirable to bring down a foot. In transverse presentation podalic version is indicated.

In cases of complete placenta prævia, Simpson recommended the complete detachment of the placenta. This resulted in an enormous foetal mortality, and while his statistics indicated favorably as to the mother's life, the same results were not obtained in the experience of others.

Barnes advocated partial detachment of the placenta by introducing one or two fingers through the os and sweeping them around in a circle, thereby separating the placenta as far as the fingers will reach. If the membranes can be reached rupture them, and ascertain, if possible, the presenting part before withdrawing the hand. He says, commonly the cervix will retract somewhat and often the hemorrhage will cease.

The late Dr. Davis of this city, in a paper read before the State Medical Society, in 1876, advised a separation of the placenta on the side offering the least resistance, by passing one or two fingers between the placenta and the uterine wall until the free border of the placenta is reached, then hooking the fingers over the border of the placenta draw it forcibly down and pack it closely against the other side, then rupture the membranes at once, empty the womb of the water as thorough-

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ly as possible; if it be a head presentation and pains are active, the presenting part will crowd the placenta to the side of the cervix on one side, and by pressure upon the bleeding vessels on the other side, the hemorrhage is stopped. Cohen also describes a similar, if not identical, method.

The induction of premature labor in all cases of placenta prævia, where hemorrhage is severe, is undoubtedly the best procedure, and in the hands of Murphy, who is one of its strongest advocates, has given most admirable results. His plan is to partially separate the placenta according to the Barnes' method, and dilate by means of the Barnes' dilators, then, after rupture of the membranes, leave the case to nature, apply forceps, or perform version according to indications.

In the current number of the American Journal of Obstetrics, is given the transactions of the London Obstetrical Society, which includes the report of a paper by Dr. Blacker, on the treatment of placenta prævia by means of a rubber bag, the invention of Champetier de Ribes. He claims for it the following advantages:

1st. Ease and facility of introduction.

2d. The certain arrest of hemorrhage.

3d. Any further hemorrhage controllable by traction upon the bag.

4th. The bag, and not the child's body, dilates the cervical canal.

5th. The ease of delivery after the expulsion of the bag.

6th. The fact that the bag is a very powerful stimulus to uterine action.

7th. The lessened fœtal mortality as compared with the results obtained after version.

The objections to its use are the risk of septic infection; the danger of rupture of the uterus, and the displacement of the presenting part caused by its introduction.

It is claimed that even in cases of complete placenta prævia the use of the bag is practicable and likely to give as good or better results than the performance of version.

Whatever be the line of treatment decided upon it is at all times necessary to stand in readiness to meet emergencies that

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arise, and in the words of Parvin, "when indicated or necessary in any case use the tampon, or the dilators, or perform podalic version, or apply forceps, or simply rupture the membranes, or give ergot, or combine any two or more of the various methods, all of these when so used being but means to one end—delivery."

DISCUSSION.

DR. GIBSON.—The essayist has read us a good paper. It is almost a classic. He has told us nearly, if not quite all, that is generally known about placenta prævia.

Some months ago I thought of preparing a paper for this society, on this subject, and collected quite a large quantity of material to that end; but it has never taken form or shape, and I think I can now extinguish my desire in that way by this few minutes talk.

As an addition to the paper of this evening, I will report the few cases that have occurred in my practice recently:

No. 1. A multipara at six or seven months. I was called to this case after the patient had been in labor for several hours, because another physician had been called, who did not respond. As I approached the patient, she said, "Doctor, the afterbirth has already come." I at once examined and found a black arm protruding from the vagina; there was no hemorrhage, though there had been some, and no sign of the placenta; as the fœtus was small, I succeeded in turning and soon delivered. I then noticed that the cord was entirely outside of the vagina and that the patient was lying on the placenta which was pressed as flat as a pancake. Her recovery was uneventful.

No. 2. This was the patient of a physician to whom I was called in consultation. Multipara, at term, placenta central. When I reached the patient the attendant had already made a hole through the placenta and reached the membranes. There was much hemorrhage, but by giving ergot freely, terrific labor pains soon came on and the child was born in a short time; both mother and child did well.

No. 3. Multipara, eight months. Was first called to this patient when she had a severe hemorrhage with a tightly closed os uteri. I tamponed firmly, and after twelve hours, with the help of the writer of the paper of to-night, I was able to turn and deliver a living child.

No. 4. I was called to this patient after she had been in the hands of a midwife for several hours. She was a multipara at

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term. I found the os dilated and extensive hemorrhage, but promptly turned and delivered a living child. This patient nearly died from hemorrhage, and had a slow convalescence. And after she was up, had a severe recurrent hemorrhage, but finally recovered. These two, Nos. 3 and 4, occurred on the same day.

No. 5. Multipara near term. This patient had many attacks of hemorrhage before the one to which I was called. She lived some distance from my office, and I was called without any knowledge of the character of the case, and found her in a state of excessive hemorrhage with a partly dilated os uteri and breech presentation. The patient was so nervous that an anesthetic was necessary, and on account of the delay in procuring chloroform the child perished. She was then delivered without difficulty, but being so exsanguined by the long and repeated hemorrhages, her convalescence was long and tedious.

No. 6 was a primipara at seven months; seen in consultation. There was considerable hemorrhage and a tightly closed os. She was firmly tamponed and safely delivered after forty-eight hours of a dead fœtus.

DR. DODSON.—In closing, I have nothing to add to that which has already been said, except to urge the importance of absolute cleanliness in the examination and treatment of these cases; nor can the importance of this be overestimated. Kaltenbach says almost as many women die of sepsis and pyemia as from bleeding; and we all know how peculiarly susceptible are these cases to infection.

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CEREBRAL LOCALIZATION.

DR. S. M. WOLFE, WILKES-BARRE, PA.

READ JULY 7, 1897.

Mr. President and Fellow Practitioners:

Cerebral localization, the subject of this paper, was suggested to me by one of our members. I accepted the subject with much reluctance, for I am fully aware of the magnitude of the work I have undertaken and how impossible it would be for even the most learned writer to cover so great a field in a paper which must necessarily be limited, but hoping I may be able to present a few points worthy of your consideration, and that you will look upon the many short-comings of the paper with a fair degree of charity, I will proceed.

I always admired an original paper, but in a subject like the above originality is of course out of the question. In preparing this paper I have referred to and freely quoted from the later literature on the subject, including the American Text Book of Physiology, Morris' Anatomy, Twentieth Century Practice, Allan Starr's Book on Brain Surgery, Keen's article in Ashhurst's Encyclopedia of Surgery, etc., etc.

While we are obliged to admit that localizing brain lesions by the focal symptoms they produce is not always possible, and that the whole science of medicine is not an entirely perfect one, we have a right to claim that our profession is fully as perfect as other branches of science and is rapidly progressing toward the goal of perfection.

A clergyman one day remarked to a physician that, at best, medicine was a very imperfect science. "That is true," said the doctor, "and do you know, I have often wondered how two preachers could meet and look each other in the face without laughing."

What we know of localizing brain centers by focal symptoms we owe almost entirely to vivisection and experimentation on the lower animals, and while this knowledge has been the means of restoring health and saving life in countless cases, yet the whole country swarms with societies made up of luna-

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tics and imbeciles who propose to manufacture legislation to prevent any further advancement of our knowledge on this most important subject. We know that a blow on the skull may sometimes produce fracture at a point remote from the injury. This, however, is a rare accident. But injury of the brain at another point than that of the external violence is not at all uncommon. There are a number of instances on record where a blow on one side of the head has produced a laceration of the brain substance and even the middle meningeal artery on the opposite side. We can understand, therefore, that if we are to operate on such a case, the site of operation must be determined by localizing brain symptoms rather than by the external evidence of injury. Localizing brain lesions through focal symptoms began only since about 1870. Before that time were the days when men were brought up in the fear of the Lord and the interior of the skull; and, as one writer says, the field was considered so unapproachable that the motto of Dante was considered an appropriate one for any over-ambitious operator: "Abandon hope all ye who enter here." Up to the above time operations upon the brain were undertaken only in cases of compound fracture with serious complications, and surgeons had little more idea that different portions of the brain varied as widely in their functions as did different viscera of the thoracic or the abdominal cavities, than had the ancients prior to the time of Harvey that blood circulated in the arteries, capillaries and veins. It is true that Broca described the speech center in the foot of the third left frontal convolution as early as 1861, and that Gall, the phrenologist, early in the present century, taught that the cerebral convolutions were the seat of psychical power and that the individual convolutions were not of equal importance, but Gall's ideas were rather unsound, for, like other phrenologists of his time, he mapped out the prominent parts of the brain by corresponding prominences on the exterior of the skull, whereas, we know now that while the brain conforms to the general outline of the skull, yet the inequalities on the surface of the latter do not indicate corresponding inequalities on the surface of the brain. In 1842, Flouren, the physiologist, taught that the cerebral hemispheres

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were the seat of perception and the will, and that these faculties were evenly distributed (not localized). From 1861, when Broca announced his discovery of the speech center, there was practically no further advancement on the subject until 1870. At this time Fritsch and Hitzig of Germany discovered the irritability of certain parts of the brain cortex to the electrical current. From 1870 to the present time, there has probably been more literature published on cerebral localization than on any other branch of medicine or surgery. We divide the cortical surface of the brain according to its function into the areas governing motion, those governing the special senses, and those for sensory perception. Any pressure upon or disturbance of one of these centers may either exaggerate or destroy its function. In case our intra-cranial trouble, whatever it may be, invades any one of these well defined areas, we are fortunate, for then it may be readily located and possibly removed, but brain tumors, etc., may come in some portion of the cerebral mass where its function is still undetermined, either in some portion of the cortex, which is still a wilderness, or perhaps deep in the white substance, in which case we have to rely on the general symptoms of intra-cranial pressure.

If a growth can be located on the cortex of the brain, it is proper to remove it, for even though some important center should be paralyzed by the operation, nature is likely to right the condition, and in a great many cases function will be restored or taken up by an adjoining portion. Thus we see that while there is no question as to the function of the cerebellum in maintaining the equilibrium of the body and coördinating muscular movements, there have been cases found post mortem where there was a congenital absence of the cerebellum and still no muscular incoördination noticeable during life. The localized areas of the brain are for motion, speech, the special senses, including sight, hearing, taste, smell and touch, the sensory area, which is subdivided into areas for muscular sense, sense of position, thermal sense, sense of pain, pleasure, hunger, etc., and for complex psychical processes. In order to locate these areas, we must observe certain landmarks on the exterior of the skull, the more important of which are the

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glabella, the orbital arch, the external angular process, the zygoma, the external auditory meatus, the bregma, the external occipital protuberance, the parietal eminence, and the sutures of the skull. The important fissures to be located from the above landmarks are the superior longitudinal sinus, which lies slightly to the right in right-handed persons, the fissure of Bichat between the cerebrum and cerebellum, the fissure of Rolando, the fissure of Sylvius, the intra-parietal fissure, and the precentral or pre-Rolandic fissure.

Various methods have been employed in determining the relations of the different fissures and convolutions to the superficial landmarks of the head. Pegs have been driven through the sutures into the brain, and the relations of these sutures to the brain thus determined. Much has already been learned from the study of sections of frozen heads. Composite photographs of dissections have also been prepared showing the convolutions and even the ventricular cavities of the brain in relation to the surface of the head, the head appearing transparent. The brain has also been hardened in situ and exposed by removing portions of the skull and casts made of the preparations. The mesial border of the hemisphere may be fixed by taking a point a half inch above the superior curved line of the occipital bone, three quarters of an inch for the right side (one quarter inch for the left) from the center of the external occipital protuberance to the naso-frontal groove. This line gradually approaches the middle line as it is traced forward in consequence of the narrowing of the superior longitudinal sinus. The fissure between the cerebrum and cerebellum which corresponds to the lateral sinus may be fixed by drawing a line from the external occipital protuberance to the external auditory meatus on either side. To locate the fissure of Rolando we take a point on the middle line fifty-seven per cent. of the distance from the glabella to the external occipital protuberance, or about one-half inch behind the mid-point of a line drawn between these two points and run downward and forward a distance of three and three-eight inches, at an angle of seventy-one and five-tenths degrees. Reid gives the following directions for finding the fissure of Sylvius: Draw a line from

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a point one and one-fourth inches behind the external angular process of the frontal bone, to a point three-fourths of an inch below the most prominent part of the parietal eminence. Measuring from before, backwards, the first three-fourths of an inch of this line will represent the main fissure, and the remainder of the line will indicate the horizontal limb. The ascending limb will start from the posterior end of the line indicating the main fissure, and run vertically upward for about one inch. The pre-Rolandic sulcus runs parallel to and just behind the coronal suture, and is of importance as it limits the motor area anteriorly. The intra-parietal fissure lies posterior to the fissure of Rolando and is the posterior limit of the motor area.

The motor area of the brain is located on the outer surface of the hemispheres in the convolutions lying immediately in front of and behind the fissure of Rolando, or in the ascending frontal and ascending parietal convolutions, while on the mesial surface of the hemisphere it is situated anterior to the upper end of the fissure or Rolando in the para-central lobule. The motor area on the external surface of each hemisphere is subdivided into an area governing the lower extremity, one for the upper extremity and one for the head and face. The leg area occupying the upper part of the motor region, the arm area lying next below, and the head and face area lying at the lower part of the Rolandic fissure. As the motor portion is much expanded at its upper part, the leg area is considerably wider antero-posteriorly than the rest of the motor region. The trunk is said to have some slight representation in the external surface of the hemisphere, but it is not well defined. On the middle surface of the hemisphere we have motor representation for the arm, trunk and leg, lying in the order named, from before backward. This area on the mesial surface is confined almost exclusively to the para-central lobule. Each of three sub-divisions of the motor area on the external surface of the brain have been again subdivided into areas governing the individual parts, such as areas which, when stimulated, will move the thumb, great toe, eyelid, jaw, pharynx, etc., etc. Taylor reports a case where an injury which destroyed the arm area produced a brachial monoplegia of the opposite side

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which almost entirely recovered after two years. Hun reports a case of traumatic epilepsy where the spasmodic seizure always begun in the left foot—later there was left hemi-paresis. The autopsy showed a hard tumor in the upper extremity of the post central gurus near the longitudinal fissure. Mills reports a case where a small gumma, involving the leg area both in front and behind the fissure of Rolando on the left side, produced severe attacks of left-sided spasms, which, however, begun by twitchings of the right foot and toes. Other similar cases have been reported by Horsley, Seguin, Koenig and others. In regard to the motor area governing the muscles of the trunk, not very much is known. It is said that that portion of the motor area controlling the muscles of the abdomen is situated on the mesial surface of the hemisphere, while the portion controlling the muscles of the back and chest lies on the external surface. The motor area for the cephalic extremity is subdivided into the portion governing the head and that governing the face. This latter is situated in the lower part of the motor area on the external hemisphere. Bissaud reports a case where a patient, recovering from a right-sided hemi-plegia, developed a right-sided facial paralysis, with muscular atrophy, hyperasthesia, ptosis, and dilitation of the pupil, followed by death. The autopsy showed a focus of softening just behind the lower end of the Rolandic fissure. Beinheim reports a case where the only paralysis was a pronounced deviation of the tongue to the right. No aphasia. The post mortem showed a sarcoma located near the foot of the left pre-Rolandic convolution. Bramwell reports a case where spasmodic twitchings always begun in the platysma muscle of the right side, in which a spicule of bone was found protruding into the post-Rolandic convolution.

In concluding the motor area, I append the table given by Beevor and Horsley, as follows: The centers for the lower extremity are arranged progressively from before backward. The most anterior center for the highest segment of the extremity and the centers for the rest of the extremity in serial order, as if the lower extremity lay lengthwise on the convexity of the hemisphere. The centers for the upper extremity are arranged

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in a similar way, but lengthwise along the fissure of Rolando. The centers for movement of the head are situated in front of the motor zone in the foot of the first frontal convolution. The centers for movement of the trunk, especially represented on the internal surface of the hemisphere, are between those of the thigh and shoulder. The centers of the face are arranged progressively from above downward, respectively, for the representation of the eyelids and the mouth in the inferior Rolandic region as far as the lower extremity at the level of the ascending parietal convolution. The center for the movements of the eye is in front of the ascending convolution on the same level. The center for the larynx, the pharynx, and for mastication are in the lower end of the ascending frontal convolution. Either paralyses or spasms of the structures governed by these known centers lead us to suspect some difficulty with or near the center itself. Irritative lesions are said to produce spasm, while destructive lesions produce paralyses. Total destruction of the motor area of one side will produce a complete hemiplegia of the opposite side, while partial destruction will produce a monoplegia. I remember a man being brought to the accident room of Jefferson Hospital when I was resident there with the history of having fallen on the street a short distance away. He was apparently unconscious, right pupil widely dilated. If the right leg or arm were lifted, they would drop listlessly. A pin could be stuck into the flesh of the right side for half its length without eliciting any evidence of pain. Breathing was one-sided and stertorous. The whole resident staff distinguished themselves on this occasion by diagnosing an apoplexy in the motor region of the left side, probably from the middle cerebral artery, but when an attempt was made to introduce a metal catheter which had just been taken from a basin of hot water, and was possibly a little warm, the fellow suddenly got up and threatened to thrash the whole crowd. We found afterward that he was a crank who had been going the rounds of the hospitals and fooling the doctors by wholesale, and he certainly did it to perfection. Another case you may remember happened in the University Hospital two or three years ago. As Professor Wood was beginning his clinic, a

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man was carried in unconscious, cyanosed and in a condition of opisthotonos. His friend who accompanied him said he had taken a headache powder at a neighboring drug store a few minutes before. Wood diagnosed the case as one of strychnine poisoning, and began to speak of the symptoms, while the assistants were removing the man's clothes, when suddenly he was surprised to hear the patient remark, "Don't break those studs." He now seemed perfectly conscious, and after examining him again, Wood remarked: "Gentlemen, we have here a case hysteria and not strychnine poisoning." In another minute, however, the man was in another tonic spasm, cyanosed, frothing at the mouth, etc., and in a short time died. A post mortem revealed a large cerebral hemorrhage. The question then arose, Did the hemorrhage produce the convulsions or did the convulsions produce the hemorrhage? A chemical analysis of the contents of the stomach, however, showed a large amount of strychnine.

The sensory centers of the brain are not nearly so well determined as are the motor areas. The one that is accurately and absolutely fixed is Broca's speech center in the foot of the third left frontal convolution, said to be on the right in left-handed persons. The center of sight, formerly supposed to be located in the angular gyrus or inferior parietal convolution, is now known to be in the cuneus, which lies in the occipital lobe. Destruction of the angular gyrus does not interfere with vision, but the destruction of one cuneus causes a hemianopsia of both eyes, the hemianopsia being on the same side as the lesion. Destruction of both cunei causes permanent blindness. The angular gyrus is certainly concerned in vision, but its function is of secondary importance. There is some difference of opinion in regard to the center for hearing, but it is no doubt situated in the temporal lobe. Whether this center is unilateral or bilateral is as yet unsettled. The majority of writers claim this center to be bilateral, and that the ear on one side is served by the center of the opposite side, nearly all agreeing that a lesion of both sides is necessary to produce complete deafness. A lesion of one side will produce a marked decrease of hearing on the opposite side and a slight decrease

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on the same side. This center is subdivided into three areas, a center for auditory perception, a center for auditory memories, and a center for perception of words—a destruction of the word center producing word deafness. The center for smell is situated at the tip of the temporal lobe. Hamilton and Jackson each report a case of epilepsy with an olfactory aura preceding the convulsion. The autopsies showed in the one case a tumor, and in the other, acute softening of the temporal lobe. Mackey and Worcester report similar cases. The taste center lies in the temporal lobe adjoining the olfactory center. The frontal lobes are no doubt concerned in complex psychical processes. The general symptoms of intra-cranial pressure are headache, nausea and vomiting, either insomnia or drowsiness, convulsions, paralyses, etc. Special symptoms depend on the location of the lesion. A lesion of the cerebellum will produce the general symptoms and incoördination of muscular movements. A lesion of the pons will produce a paralysis of one side of the face and the opposite side of the body. A lesion of the copora-quadrigemina produces, in addition to the general symptoms, incoördination and paralysis of the ocular muscles, especially the superior and inferior recti. A lesion of the peduncles will produce paralyses of the structures governed by the seventh and twelfth pair of cranial nerves and of the extremities of the opposite side of the body. A lesion of the optic-thalamus presents no very definite symptoms; hemi-ataxia, hemi-paresis, and involuntary crying are said to be symptoms of a disturbance of this structure. Lesions of the left hemisphere are much more frequent than of the right. An injury of the left hemisphere also produces much more disturbance of function than does one of the right. This is due to the fact that the higher sense organs of the right side are more perfectly developed physiologically than are those of the left.

When we consider the wonderful advancement that has been made on the subject of cerebral localization in the past twenty years, we have a right to expect that a few years more will see many points now in dispute definitely settled and much additional information gained. I was much interested in a paper recently read before the society on the subject of operative in-

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terference in epilepsy. I believe the average physician passes over his cases of epilepsy with entirely too much indifference. Every case of epilepsy is deserving of the most careful study on the part of the physician. While I would not advise reckless operative interference in these cases, I do believe that we should make a careful study of every such case, and if even in a small per cent. of our cases we should be able to locate some lesion of the brain, and thus cure our patient, we would surely feel amply repaid for our extra efforts. Very much more might be said on the present subject, but as the paper is already much longer than I originally intended, I will close. I thank you for your attention.

DISCUSSION.

DR. H. HAKES.—We are under many obligations to the essayist for the able presentation of the subject of his paper, not so much, however, for the amount of established facts presented, as for the ground plan he has indicated, upon which future investigations may possibly erect substantial guide-posts to correct salutary and scientific lines of diagnosis and practice. The term "cerebral localization" is a somewhat clumsy and indefinite phrase. Literally, the location or localization of the cerebral mass is on the top of the body when in erect posture. But that is not what is meant by the term. In fact, we must yet coin the proper word or phrase. What we really mean by the awkward expression is, to locate or determine from certain uniform symptoms, the exact location in the cerebral mass from which they proceed, to the intent that we may know precisely where to direct our efforts for amelioration and cure. The dissection of the brain, its microscopical examination, its physical structure or arrangement, or its chemical constitution, or metamorphosis in performance of function, yields us nothing upon which theory can formulate the laws of cerebral function, or inform us of the symptoms that will follow the cerebral disease or injury.

We must, therefore, commence at the other end of the subject, and, so to speak, work backwards, or, in other words, begin with the symptoms or results produced, and trace therefrom to the initial cause. This is easier said than done; yet we are, as the essayist says, in possession of enough facts to already locate, with fair precision, the cerebral centres from which proceed the manifest symptoms indicative of cerebral

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disorder, giving symptoms in diverse and distant regions of the precise point of cerebral disturbance, to warrant us in assuming that, by long and patient observation, we may still further increase our knowledge in this respect, until, as a finality, every cerebral lesion or disturbance shall be readily determined by the symptoms presented. The essayist has mapped out the routes along which such investigations must proceed. As the case cannot be worked out by any known theory, it can only be made clear, plain and practical by a rigid and critical interpretation of symptoms as you will observe them in ordinary practice. But I feel assured that if the members of this society will observe carefully and patiently, in and out of season, the relation that the symptoms or manifestations bear to the lesions that are found, you will in ten years solve many a riddle and be able to lay before the profession and the world models of the working tools that will unlock the secrets that have as yet been carefully preserved from the gaze of our profession. Up to the present time we are almost confounded by the fact, that the brain can occasionally receive such destructive injury, without producing death or dangerous symptoms, and again, upon very slight injury, fatal results are prompt. Can this be accounted for upon the supposition that there is an enormous innate power of resistance in the former case, and a corresponding inability to endure injury in the latter? Or is it possible that careful investigation would show us that it is not so much the amount of injury in either case that determines the result, as the precise and particular parts that are injured. It is only of recent date that the attention of the profession has been directed in this field of inquiry. I am glad that this subject has been brought to our attention by one of the younger members. Among all our studies and duties it is possible to give especial note and attention to this novel problem, and for the younger members to rear before the world a monument upon which the profession shall inscribe "FAME."

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DOUBLE CONSCIOUSNESS.

READ AT THE MIDSUMMER MEETING AT GLEN SUMMIT, PA.,
BY DR. LEWIS H. TAYLOR, WILKES-BARRE, PA.
AUGUST 4, 1897.

Mr. President and Members of the Luzerne County Medical Society:

You have all probably read "Dr. Jekyl and Mr. Hyde," that weird story of Stevenson's, in which the chief character is part of the time a refined, gentlemanly physician, and at other periods, through the working of a powerful drug, a debased, low-lived, miserable villain. Fortunately the counterpart of this story is not often seen in real life; but facts have been seen, almost as strange, and many of them recorded by persons fully capable of accurate observation. Ian McLaren, who seems always inclined to take an optimistic view of life, told us recently, in a lecture delivered in Philadelphia, that there is no wickedness in life so great but what its counterpart is still more basely portrayed in fiction; and on the other hand, there is no virtue or goodness portrayed in fiction, however beautifully it may be presented, but what its counterpart or better may be found in real life if we only know where to look for it. So we may say, that there is no pathological or psycological condition portrayed by the novelist so rare or strange but that the experience of nearly every physician can match it from actual life by another equally strange and interesting.

On the twenty-sixth of last April, a young lady twenty-five years of age, educated, refined, attractive, the daughter of a millionaire living in Brookline, Boston, left her home to be gone a few minutes. She was dressed in her ordinary street attire, but had slippers on her feet instead of shoes. She had only six dollars in money with her, and left her watch and jewelry on the bureau in her room. She was seen to board a Reservoir car, and since that time the members of the family have not set eyes upon her, or at least had not up to three weeks ago. "She was searched for among her friends, she was not found lying ill in any hospital, the morgue did not give up her

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body, steamship lists were examined, inquiries were made anywhere and everywhere but without avail. There was no motive so far as known for her sudden departure. Had she planned to run away from home she would evidently have taken money for her expenses, as plenty of cash was at her command. If enticed away and kept as a prisoner, it is strange that in two months and a half she has not found some means of communicating with her family. If murdered, it is strange that her body has not been found."

Now, Mr. President, why did this young lady, surrounded by all that was calculated to make life endurable and pleasant, so suddenly leave her home in this strange manner? In the minds of her friends she is no doubt under the ban of suspicion. Very likely there has been many a shrug of the shoulders, and wise shake of the head, and an "I could tell if I would" remark, only tending to blacken her hitherto fair name. If she is ever restored to her friends, I believe it will be found that she wandered away from her home totally oblivious of her past life and surroundings. In other words, that hers is a case of *Double Consciousness*, and it is to this subject I desire to call your attention to-day. Perhaps *Double Personality* would have been a better title for the paper.

It may be a difficult subject to bring within the compass of a single essay, and you may probably feel that the essayist is entering an unknown realm that we had better leave unexplored. An yet there has seemed to me, Mr. President, sufficient of interest in the histories of some of these cases that I shall read to you, to warrant us, for one day in the year at least, in turning aside from our usual paths to consider a subject but little known, even if it should lead us a short way into the realms of speculative fancy.

Conciousness itself is not readily explained. We are none of us so far away from our student days but that we remember some of the arguments used to show that it was a distinct faculty of the intellect, and others to show that it was not. We do not regard it now as a distinct faculty of the mind such as memory, imagination, or perception, but rather as that general power of the mind by which it recognizes its own acts. Some

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one has said: "It is rather an illumination of the mind's activity, a portal through which the Ego catches glimpses of itself; a point *d'avantage* from which we are able to distinguish the external world from the internal, the objective from the subjective." Consciousness may be diseased or perverted. It may suddenly cease so far as the real Ego is concerned, and yet, with all other powers of mind and body alive and in order, the man may go on living a new life, in new environment, and we may say, with new consciousness and with the old entirely forgotten for a time.

In one sense every one leads a double life. There is the man as he is known to the world, or even to his intimate friends, and then there is the real Ego, known only to himself and to his Maker. These may be essentially distinct in many respects, and quite different in different periods of his life. Goethe says: "Two souls dwell within my breast," and who of us has not felt at times the one warring with the other? and happy is he who succeeds in conquering the baser self. But it is not to this branch of an intricate subject that I desire to call your attention, but rather to that other condition in which the man loses the real Ego with all knowledge of his surroundings and becomes, for the time, essentially another being. This second life or condition may become permanent and totally replace the former, which becomes wholly lost, the second becoming the normal and sometimes distinctly the better life, as was the case with Felida X., Dr. Azam's oft-quoted patient; but frequently from some cause, as unexplainable as the former aberration, the patient suddenly comes back to his former self, takes up the thread of life where it was broken off, and lives again among the scenes and friends of his former existence.

This may be best illustrated by the recital of some well authenticated cases, one of the most interesting of which is that of the Rev. Ansel Bourne of Rhode Island, an evangelist and farmer.

"He left his home in Rhode Island January 18, 1887, and after transacting some business in Providence, went to Boston, then to New York, then to Philadelphia, and finally to Nor-

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ristown, Pennsylvania, where he opened a store for the sale of confectionery, stationery, and other small articles. In this business he was known as A. J. Brown. He lived in a room at the back of the store; cooking, eating and sleeping there. He went back and forth to Philadelphia for goods to keep up his stock, and conducted his business as if he were accustomed to it. On Sunday, March 13, he went to church, and at night went to bed as usual. On Monday about five o'clock in the morning, he awoke and found himself in what seemed to him to be an entirely new and strange place. He could not imagine how he came to be there, and thought he must have broken into the place in his sleep. He waited impatiently for two hours, all the time fearing arrest, and then began to explore his surroundings. He went out into the hall and seeing a door, knocked and was answered by his landlord, who accosted him familiarly with, "Good morning, Mr. Brown." "Where am I?" he replied; "my name is not Brown." He declared that he knew nothing of Norristown nor of the stationery business; that he was in Providence on January 13, which he supposed was the previous day, and saw the Adams Express wagons on Dorrance street, and since that time he had no idea what had transpired. The landlord thought he had suddenly become insane, and he called a physician. To the physician he said his name was Ansel Bourne, and that he lived in Rhode Island; that the people in whose house he found himself declared that he had been living with them six weeks, but, for his part, he had never seen one of them until this morning.

"His friends were notified; they came on and settled his affairs, and A. J. Brown went back to Rhode Island and resumed his occupation there as Ansel Bourne, but of A. J. Brown, of his journey to Norristown, and of the business which he carried on there, he had not the slightest knowledge. Dr. Richard Hodgdon, Secretary of the Society for Psychical Research, and Professor James of Harvard College, now became interested in the case; they went to see Ansel Bourne and learned the particulars of his strange experience; but of the journey from Providence to Norristown no informatiou whatever could be obtained. At length Ansel Bourne was put into the hypnotic condition, when he was again A. J. Brown. He then remembered all about his business at Norristown, and described minutely the journey from Providence to Boston, New York, Philadelphia and Norristown, giving the names of the hotels at which he stopped and the people whom he met—all of which was subsequently carefully verified. He thought

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he had met Ansel Bourne, but had never known him intimately; and when introduced to the wife of Ansel Bourne, while he thought possibly he might have met her, he very strongly repudiated the idea that she was or ever had been his wife. On being awakened from the hypnotic sleep he was again Ansel Bourne, with all his usual feelings, opinions and affections, but not the slightest knowledge of A. J. Brown, nor of the business he carried on at Norristown; and certainly of any good or evil deed which A. J. Brown might have done, he (Ansel Bourne) was absolutely ignorant and not in any manner to be held responsible."*

Dr. Horatio Wood relates the following, which is probably the same as that described by Dr. Mitchell in *Medical Repository*, 1817, as a case of *Double Consciousness* or *Duality of Person* in the same individual:

"A young girl, quick, active, full of life and animation, suddenly complained one day of a very severe headache, and lay down on the bed. She became unconscious, but awoke in a few moments conscious, although no longer the being that she had been. She was a stranger in a strange land. The father, mother, sisters and brothers were unknown. The results of years of education had been annihilated. She knew no more of her native tongue than does the child just born. Where vivacious before she was now dull; where apt to learn she was slow; where before slow to learn, she was now apt. She had to be educated over again. She lived her life, learned her lessons, until she could read and write, and knew her friends once more. Suddenly the headache again came upon her and a deep sleep fell over her. She again woke up to the old being; the language acquired in infancy had returned to her; the facts learned through long years were with her; the acquaintances of the old time were her friends. Her acquaintances, the lessons learned, the facts and events of the second period, however, she knew no more. So she went on until the headache returned, the sleep was again on her, and she awoke again her second self. At the very page where her education had been interrupted in the second state it was now taken up. She recognized the friends of the second state, but she knew none of the first state. So through years she lived on her double life, now one person, now another; each state being connected with or rather a continuation of the previous corresponding state. In such a case the lawyer and the theologian alike

*Quoted from "Duplex Personality," &c., by Dr. Osgood Mason, Jour. Amer. Med. Assoc., vol. xxv, p. 928.

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might argue a long time concerning personal responsibility and the metaphysician labor in vain to find the Ego."* He also gives the following, bearing more nearly on Insanity:† "I watched through long years a woman suffering with an apparently hopeless melancholy, whose final recovery I have seen resembled, but never completely paralleled. She had been the most refined and elegant of women. Taken in middle life with insanity, for fifteen long years her character was altered and her demeanor changed. She was bowed down always with the terrible woe of a lost soul. Suddenly one evening that woman went down on her knees and prayed the livelong night. She had an attendant, wise beyond women, who let her alone. When morning came the lady arose and said she had found Christ. Her old character had returned; the original elegance of manner was registered in every act; the original delicacy of thought came out from the recent almost brutal crudeness, like blossoms from a forest of wood in the early spring. This lasted for a few days; then she said the cloud was coming, and as the dark thunder-cloud drifts across the sunny landscape, so there came over her the shadow of a great woe. After days or hours she would suddenly raise her head, and say, 'The light is coming,' and out of the darkness the old, gentle, persuasive being would come forth, with no traces of insanity about her."

Dr. David Skae, in *North. Journal Med., Edinburg*, details at length the case of a lawyer "of a leuco-phlegmatic temperament, regular in his habits and temperate," who developed symptoms entirely at variance with his usual character. These finally became distinctly periodic. "On each alternate day the patient is affected in the manner described, and on the intermediate days he is, comparatively speaking, quite well, enters into the domestic duties of the family, eats heartily, tranacts business and appears to have no apprehension of a return of his complaint. What is chiefly remarkable is the sort of double existence which the individual seems to have. On those days on which he is affected with his malady he appears to have no remembrance whatever of the previous or of any former days on which he was comparatively well, nor of any of the engagements of those days. Neither does he anticipate any amendment on the succeeding day, but contemplates the future with unmitigated despondency. On the intermediate days he asserts that he is quite well and denies that he has any complaints. He distinctly remembers the transactions of previous days on

* A Study of Consciousness—Century Magazine, vol. xviii, p. 72.

† Ibid.

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which he was well, but appears to have little or no recollection of the days on which he was ill. He appears, in short, to have a *double consciousness*, a sort of two-fold existence, one-half of which he spends in the rational enjoyment of life and discharge of its duties and the other in a state of hopeless hypochrondriacism. An endless variety of remedies have been used but without effect; change of scene being the most effective treatment."

Dr. S. Jackson, in *Am. Jour. Med. Sci.*, 1869, relates a number of interesting cases, among them one of a young girl, who, after passing through various phases of mental and physical ailments, finally developed a new series of symptoms, "which were supposed to proceed from *duality* of *consciousness*. The first manifestation was in doing some act incompatible with her natural deportment; for instance, suddenly going into the kitchen, dressing a beefsteak, carrying it up into the parlor and placing it on the table, when suddenly returning to her natural character, she was surprised at the arrangement just made, and utterly ignorant of all she had been doing. At other times, without saying anything to her mother, she would put on a shawl and hat, go out into the streets, which was not a habit, and return to her proper consciousness without knowing how she came there. These attacks were marked by a change of voice and total change of character. From being mild and gentle she would become abrupt and rude. At other times she would in this state play upon her piano or go to work, sew or engage in some other familiar occupation about which she would not remember afterwards. She always supposed she had been asleep."

Dr. Thomas Mayo, in *London Medical Gazette*, 1845, relates a case of a girl who had alternating states of *consciousness*, but in both of her states, the normal and the abnormal, the associations which have taken place in each, are obstinately retained without the smallest confusion, but in each with a total oblivion of what had been learned in the other state. Thus, in her normal state, she will have entirely forgotten all those manual and intellectual acquirements which she may have made during that of excitement."

The following case of *double personality* is given in the Journal of the American Medical Association, August 8, 1896:

"At the Philadelphia Hospital a curious case of loss of memory has excited much interest, among neurologists especially. The patient, a young man, after four months' stay in the hospital has been recognized by Dr. E. F. Robinson of the resident

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hospital staff as a former college companion named Spencer. The patient, however, did not recognize Dr. Robinson nor acknowledge the name. In fact, he did not remember his name at all, and could not give any when admitted to the hospital, nor could he remember anything about his previous life or explain how he came to be in Philadelphia with nothing in his possession save some pawn tickets made out in the name of George Brandt, under which name he was received into the hospital.

"Dr. Daniel E. Hughes, the superintendent, took great interest in the case and recently brought him before the Neurological Society.

"Dr. Hughes considers the case a loss of personal identity, or of double personality of the Archibald Malmaison type. Mr. Spencer's home is in Lawrence, Kansas, where his father resides. He was last heard from January 27, in Washington, but he can give no account of his wanderings before coming to Philadelphia. * * *"

Sometimes this strange mental condition is brought about as the result of injury. A despatch from Cape May, under date of January 9, says: "With a lusty cry of "eight bells!" skipper James G. Nickerson of the schooner Lucy started up in bed at his home and found that he had regained the mental health which fled from him two days before Christmas. He is entirely rational, but can give no account of himself since the accident that day, when a heavy plank on the gangway struck his head. This was at Newport News, Va. That day he disappeared. After much search by his relatives, without success, an ancient fellow-mariner fell in with him on the streets of Wilmington, N. C., and, recognizing his condition, took him to the mayor of the city. That official found papers on him which disclosed his identity and notified Nickerson's relatives. A brother went after him and brought him home. They reached here Wednesday, the captain's mind still blank. His recovery was as sudden as his peculiar affliction."

Dr. J. N. McCormack, in *Medical Record*, May 26, 1883, relates the case of a farmer, aged 23, of not very great intelligence, who had eight years before been struck on the head with a pointed hammer. He was unconscious for several hours, but finally recovered. He continued to work and seemed as well as ever, though there was a noticeable depression in his skull. Four years later he moved to another town, purchased a farm, and married. His mind seemed normal until six months previous to his being seen by the writer. He then

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showed evidences of insanity, and finally became acutely maniacal. Dr. McCormick examined him and found a deep depression, the size of a silver quarter, at the junction of the sagittal and coronal sutures. He was trephined and the depressed bone removed. He recovered immediately after the operation; however, he seemed impressed with the idea that he had just recovered from the blow on his head. Everything since that time was a blank. He did not know his wife, or know that he had one. His neighbors were strangers, and everything he had done had to be explained to him. He had to learn the roads in the neighborhood. He talked intelligently and candidly. Before the operation he had been boisterous and turbulent in disposition. After it his manners were quiet. Dr. McCormick does not think he could be feigning.

Foville relates the case of a soldier who believed himself dead since the battle of Austerlitz, at which he had been seriously wounded. When asked about his condition he would say, "You want to know how old Lambert is? He is dead; he was carried off by a cannon-ball. What you see here is not he, but a poor machine, that they made, in imitation of him; you ought to ask them to make another." In speaking of himself he never said "I" but "that thing." His skin was insensible and often he would fall into a state of complete insensibility and immobility, lasting several days. The case might be thus interpreted: "Before his accident, this soldier, like every one else, had his organic consciousness, the sense of feeling of his own body, of his physical personality. After the accident a profound change was produced in his nervous organization. Concerning the nature of this change we can, unfortunately, only form hypotheses, the effects alone being known. Whatever it may have been, it resulted in the formation of another *organic consciousness*—that of a 'poor machine.' Between this and the old consciousness, the memory of which still tenaciously remains, no amalgamation is effected. The feeling of identity is lacking."

These are cases reported by competent observers. I have many others which I cannot impose upon you to-day, but those I have given are sufficient and more than sufficient to make us pause in wonderment at the possibilities of the individual just on the borderland of mental aberration, or at the possibilities of any individual in any period of life. I believe there is many a man lost to his friends and the community in which he lived, who is under suspicion of irregularity in moral conduct,

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who is nevertheless entirely innocent, and is probably living elsewhere a perfectly correct life, with all his former knowledge and associations blotted out. Like the derelicts on the ocean they sail forth hither and thither unknown. Perhaps a favoring breeze may waft them again to the known harbor, perhaps they may go down without ever giving a sign as to whence they came or as to whither bound.

I admit also that it is possible for one to use the simulation of double consciousness as a cloak to his evil deeds, but we should hesitate before condemning any man or woman who suddenly disappears without a known cause, and at least cover such with the mantle of charity.

Now, Mr. President, what shall we say as to the cause of these phenomena? Better, perhaps, be silent and admit our ignorance in the face of these interesting facts. You will say that some of the cases related touch the realm of insanity. So they do, but what is insanity? Some are hysterical. What is hysteria? I have a number of histories of cases which clearly come under the head of insanity, but I have avoided mentioning these. In the asylums we find the most grotesque forms of assumed and varying personality. As Meyers quotes: "We have the man who has always lost himself under the bed. The man who maintains there are two of him and sends his plate a second time, remarking, 'I have had plenty but the other fellow has not.' We have the man that is himself and his brother too, and when asked how he can possibly be both at once, replies, 'Oh, by a different mother.'"

An endless variety of these might be given but they are different from those I have portrayed to you. The insane individual lacks the power to carry on business transactions, or in general to keep up continuous thought, but here we have apparently rational actions and memory, though distinct for each state.

The subject of double consciousness is closely allied to somnambulism and hypnotism, of which, of course, we cannot treat within the limits of this paper. They have struggled through periods of obloquy and disgrace, especially hypnotism, to be slowly recognized by the medical profession, the only proper body to study them.

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I believe hypnotism has a legitimate field of usefulness and the recognition it has had from medical men in the past fifteen years has helped amazingly to place it where it belongs, on a scientific basis, to be used in proper hands as a proper therapeutic agency. The subject of double consciousness is more a matter of interest than of practical value. I remember a physiology that I studied when a boy, that had a wonderful figure in the front of the book, supposed to represent "the human form divine" with the admonition: "Study me, for I am fearfully and wonderfully made." This is true of the body; so is it of that power which is more and higher than the body, the mind.

We may not be able to explain these phenomena which I have read to you and yet we may make shrewd guesses as to their cause. We cannot say it is simply a failure of memory for memory is a faculty, apart from. consciousness, and consciousness is distinct from memory.

You remember that book which you were all reading two or three years ago, in which one of the chief characters, "Little Billie" receives a severe shock in the loss of the woman he loved, which finally ended in brain fever and a long tedious illness, from which he slowly recovered! But his nature was changed. Part of him was gone. He had lost the power of loving, "it seemed that something would never come back, not even his love for Trilby; where all *that* had once been was a void, a gap, a blackness."

"It was as if some part of his brain had been paralyzed while all the rest of it was as keen and active as ever. There was something which no doctor could explain or cure. He felt rather bitterly how happy he could be, if the little spot, or blot, or knot, or clot, which paralyzed that convolution in his brain, where he kept his affections, could but be conveyed away." His own diagnosis occurs in his talk with his dog Tray: "Wait," he says, "until you get a pimple inside of your bump of—wherever you keep your fondness, Tray, for that's what's the matter with me—a pimple—just a little clot of blood at the root of a nerve, and no bigger than a pin's point."

And who of us shall say that the author in his fiction did not come near to a great truth? There may be some cause

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so very slight that throws the great machine out of balance, or starts it on a new career, a little, little clot, who shall say?

"Sir Henry Holland, first studied (1840) the brain as a double organ and suggested that certain aberrations of the mind might be due to the irregular action of the two hemispheres. In 1844 Wigan went still further. He maintained that we had two brains and not merely one; and that the *corpus callosum*, far from being a bond of union is a wall of separation, affirming even more positively than his predecessor the duality of the mind."

This has been amplified by others and numerous experiments made showing that a relative independence of the two hemispheres of the brain exists, but which by no means excludes their normal coördination. This has a grain of truth in it but Ribot has shown that it falls far short of explaining all the facts.

Dr. Myers, in *Proc. Soc. for Psychical Research*, London, 1886, on the subject of Multiplex Personality, recites at length the details of the case known as Louis V. It is full of interest and I should like to read it to you but you have had more than enough already. He then sums up as follows:

"Is there, then, the reader may ask, any assignable law which governs these strange evolutions? Any reasons why Louis V. should at one moment seem a mere lunatic or savage, at another moment should rise into decorous manhood, at another should recover his physical soundness, but sink backward in mind into the child? Briefly, and with many reserves and technicalities perforce omitted, the view of the doctors who have watched him is somewhat as follows: A sudden shock, falling on an unstable organization, has effected in this boy a profounder severance between the functions of the right and left hemispheres of the brain than has perhaps ever been observed before. Those who have followed these lines of observation may be somewhat prepared to think it possible that in Louis V.'s case the alternate predominance of right or left hemisphere affects memory and character as well as motor and sensory innervation. Inhibit his left brain (and right side) and he becomes, as one may say, not only left-handed but sinister; he manifests himself through nervous arrangements which have reached a lower degree of evolution. And he can

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represent in memory those periods only when his personality has assumed the same attitude, when he had crystalized about the same point.

Inhibit his right brain, and the higher qualities of character remain, like the power of speech, intact. There is self control; there is modesty; there is the sense of duty—the qualities which man has developed as he has risen from the savage level. But, nevertheless, he is only half himself. Besides the hemiplegia, memory is truncated, too, and he can summon up only such fragments of the past as chance to have been linked with the one abnormal state, leaving unrecalled not only the period of sinister inward ascendency, but the normal period of childhood, before his *wesen* was thus cloven in twain. And now if by some art we can restore the equipoise of the two hemispheres again, if we can throw him into a state in which no physical trace is left of the serverance which has become for him a second nature, what may we expect to find as the psychical concomitant of this restored integrity? What we *do* find is a change in the patient, which in the glimpse of psychical possibilities which it offers us, is among the most interesting of all. He is, if I may so say, born again; he becomes as a little child; he is set back in memory, character, knowledge, powers, to the days before this trouble came upon him or his worse self assumed its way."

I fear, Mr. President, that I have led you a long way through darkness, without reaching the light. The only approach to an explanation of true cases of duplex personality, to my mind, is that they are species of hypnotism or auto-hypnotism, if you choose, but this is an explanation that does not explain. The modern conception of the nervous system as presented to you last winter by Dr. Knapp and discussed by Dr. Faulds, may be the means which shall eventually solve this question. Ribot says: "Conscious personality cannot be the representation of all that takes place in the nervous centres; it is only an abstract, a synopsis of it. * * * Why do certain nervous actions become conscious, and which? To answer that question would be to solve the problem of the conditions of consciousness."

I have myself been somewhat interested in the subject superficially for some years but without having time or opportunity to give it that careful study which its importance demands. I

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believe the next few years will advance greatly our knowledge of the brain and nervous system and knowledge of psychical subjects generally.

Hypnotism, somnambulism, clairvoyance, telepathy, all offer attractive fields for thoughful investigators. As we have seen wonderful advancement in recent years in electricity and kindred physical sciences, and yet feel that perhaps we are only on the borderland of a wonderful realm of discovery, so may we feel in regard to these psychical questions. We are on the borderland.

It is the duty of the medical profession to give careful study to these subjects, and not leave them to the charlatan, as has been done to too great a degree.

We may not be able to solve them, but our successors may be wiser than we, and having done our part faithfully, that which we fail to accomplish we may trustfully leave to them.

DISCUSSION

Dr. Frank Woodbury, of Philadelphia, an invited guest, said that every one who had the privilege of listening to the very interesting paper of Dr. Taylor must feel under great obligation to him for directing attention to this very important subject of, what might be termed, alternation of consciousness or double identity. One of the most attractive phases of the subject for discussion is the medico-legal question as to the criminal responsibility of the individual for actions committed during his abnormal, or absent-minded state. How far would a plea of this character be accepted before a court? For instance, in the case of the man who carried on business while in this peculiar state of consciousness, suppose that he had set fire to his store, or made an assault upon some one, or that he had committed forgery or bigamy, or some other offence against the law, for which he had been remanded for trial, and while in prison he had resumed his ordinary condition of consciousness, and had denied all knowledge of his surroundings and of the events that brought him within the grasp of the law—could he be acquitted and discharged as if he were entirely innocent of the crime which he had undoubtedly committed? Dr. Woodbury mentioned two cases coming under his observation, in one of which the man, although married, had, after drinking for a short period, lost all knowledge of what he was

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doing and had married another woman in the same city, and lived at one of the prominent hotels for two weeks with his new wife, drinking a little all the time, but apparently rational in his conversation and actions. One morning he appeared to suddenly wake up to a realization of his position, and he at once started off on a journey for his health, leaving his somewhat complicated matrimonial affairs to be settled by his lawyer.

Another case was that of a lecturer in one of our medical institutions, who, when on his way to college one evening, took a drink of whiskey with a friend, and that was the last thing that he remembered until he found himself in the middle of a country road, lying on the ground with body battered and bruised and with his clothing very much torn and soiled. He subsequently ascertained that he was in a small town in Virginia that he had no recollection of having ever heard of before, and upon inquiry, he was told that he had engaged in a somewhat heated political discussion in the bar-room of the only hotel in the place, and as a result had been beaten by the crowd and had been thrown out into the road, where he afterwards discovered his condition as above stated. He could only account for his being in that locality on the hypothesis that he had gone to the depot, where he boarded the first train, and had been carried as far as the money in his pocket held out, and then was put off at the station at which he found himself the next day. It is true that these cases both have more than a suspicion of indulgence in spirits, and they may be attributed to alcoholism; but the result was certainly very different from ordinary intoxication, of which both individuals had had considerable experience, and resembled the trance state. The well known instance of Archibald Malmaison, in fiction, which comes into the mind of every one, is based upon reality. The important point for us to decide is, What shall be the opinion of the medical expert as to the mental soundness and legal responsibility (by inference) of a man who, being subject to such intervals of interrupted consciousness, while in this abnormal state commits some offence against the law?

The cases that Dr. Taylor referred to are also interesting from a pathological point of view, being related on the one hand to somnambulism and hypnotism and on the other to epilepsy, especially to that state of mental confusion following epileptic seizure. It cannot be that, in such cases, there is present any constant lesion of the brain, owing to the fact that the subject regains, as a rule, all his former faculties and mental attainments with the restoration of consciousness. Although not properly coming under the head of hypnotism, there may be

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assumed to be a sort of polarization of energy and cerebral activity in certain parts of the brain, while other parts cease to be active, in a similar way to the polarization and segregation of special areas, which, according to the theory of the late Dr. Beard, is supposed to account for the phenomena of hypnotism. Usually the entire cerebral cortex is assumed to be the seat of consciousness; but we know that large areas of brain surface may be destroyed by morbid growths or by abscess, without consciousness being disturbed. A case in point occurred in the practice of a prominent surgeon in Philadelphia. A lady, above forty years of age, apparently in perfect health, stopped in one day to report that the spectacles he had ordered were satisfactory, and he tested her vision and found that with them she had good vision. She was in high spirits and informed him of her approaching marriage. She had no headache and no symptom of cerebral lesion, and yet a few hours later, while having a dress tried on at her dressmaker's, she fell dead, and at the autopsy the surface of the brain was covered by hundreds of nodules of cancer ranging from small granules to masses as large as a hickory nut, which had doubtless been growing for months previous to death. In view of such facts, it can hardly be said that we know very much as to the anatomical site of consciousness in the cerebral hemispheres.

SERUM THERAPY.

BY DR. D. BARNEY, WILKES-BARRE, PA.

READ SEPTEMBER 1, 1897.

An eminent leader in the medical world some time ago gave a very optimistic view of the future possibilities of the healing art, in which he stated his belief that a time would come when all diseases, except those caused by congenital organic lesions, would be curable. Such a condition of affairs is still far from the range of our present vision, and yet we are filled with enthusiasm and hope when we review the progress our giants have made during the second half of the present century. For it was in 1850 that Davaine observed bacilli in the blood of animals dead of anthrax, which was practically the beginning of what twenty years later was known as the germ theory of disease. The study of the germ theory developed the mod-

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ern science of bacteriology, and gave us the splendid discovery of Sir Joseph Lister, which revolutionized the practice of surgery, placing it almost on the footing of an exact science. And the work of the bacteriologists has created the new therapeutic epoch, the use of animal serums and tissues to combat disease. The great strides that have been made in surgery are clearly visible: now if medicine gains as much from the new order of things the medical millenium is nearly here.

The object of this paper is to trace briefly the history of the latest offshoot of the germ theory—serum therapy.

From the time of the discovery of the bacillus of splenic fever to 1890, the efforts of the students of bacteriology seemed to be cast in the Listerian lines, and preventive rather than curative measures were studied. In 1890, however, Behring published his observations upon the possibility of rendering animals immune to the poison of diphtheria. Six years before, Lœffler had discovered and isolated the specific germ of this disease, and soon afterwards, the French observers, Roux and Yersin, showed that this poison, after being cultivated artificially, if injected into animals, produced a disease having all of the symptoms of diphtheria. Following up this line of study, Behring found that attenuated and repeated doses of the culture injected into guinea pigs rendered them at length insusceptible to the disease; and that the serum from the blood of these animals injected into others likewise protected them even when inoculated with fresh virus.

These experiments were repeated many times by other observers and the facts verified. It was soon found that all animals were similarly affected, and so the trials went on progressively from guinea pigs to cats, dogs, cows and horses. The comparative ease with which the horse can be bled, his good nature in allowing it, and the large amount of blood he can spare at one time, make him the fittest animal to aid in the work.

This was the beginning of serum therapy as we now understand it. So far we are most familiar with it in the form of the antitoxin of diphtheria, but already other antitoxins are on the market, and soon they will be as common as calomel and quinine. As to the value of antitoxin in diphtheria, that most

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dreaded of diseases, we can all bear cheerful testimony. For we well remember with what foreboding we approached a new case prior to two years ago. How we hoped and prayed (for it is held that all strong desire is prayer) that the case might prove a light one, so that our bungling, imperfect remedies might be of use! How we went to work energetically and earnestly with our washes and gargles, our atomizers and steam sprays, our calomel and petroleum and everything else in turn that our fancy could devise or the pharmacopœia yield, and when our fighting, struggling little patient ceased to struggle, and the victory went to the other side, we sighed, and admitted that the disease had gotten too strong a hold, or that we had come too late to be able to do much. And if perchance the little one happened to get well, although we received all credit for our work, we knew full well that the constitution of the child, or the mildness of the disease had more to do with the recovery than did our puny efforts. For the death rate remained pretty constant at fifty per cent. and often rose much higher in certain epidemics.

But now the picture is quite different; diphtheria is robbed of much of its terror, fewer drugs are employed, the anxiety of the physician is lessened, and best of all, the death-rate is lowered. It is true that many drawbacks and dangers still exist; that some cases will be seen too late, some will be too virulent even for the antitoxin treatment, and they will be lost; but enough proof has accumulated from the various parts of the civilized world to show the undoubted value of serum treatment in this disease. It is still very new and doubtless it is susceptible of much improvement. Better methods of administration will be devised, more accurate dosage will be learned, and the serum itself will be strengthened and its mischievous elements eliminated. It took more than twenty years to develop Listerism, with its voluminous wrappings of protective, gauze, and mackintosh, into the aseptic surgery of to-day with its simple cleanliness, and it may take as long a time to develop a perfect system of serum therapeutics.

The value of antitoxin treatment, however, is not universally conceded at present. There are many objectors even among

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men whose scientific attainments entitle them to a hearing. And strange enough, the laboratory, the birth-place of antitoxins, furnishes some of the strongest objections to their use. For example, pure horse serum has been injected into guinea pigs and rabbits and the results noted. It was found that the temperature was raised and the pulse accelerated, and later the heart weakened; and almost invariably a condition of cloudy swelling was found in the kidneys. It is then argued that if animals are so affected it is reasonable to suppose that the same will hold true in man. And, further, since the Klebs-Lœffler bacillus is often found in the mouths of healthy individuals, and that every pseudo-membrane found in the fauces of children does not of necessity produce diphtheria, therefore it is probable that the injection of antitoxin serum, by producing heart failure and acute nephritis, may in the long run raise rather than lower the death rate.

On the other hand, we have a report from *Dr. Lacrus*, of Barcelona, to the effect that pure serum drawn from a healthy horse was injected into several children in his hospital wards, in doses of from 3 to 5 c. c., daily, for a period of three or four weeks. In every case the serum seemed to act as a powerful tonic: the red corpuscles increased in number, weight was gained, and the children became visibly stronger. There was no erythema nor albuminuria. The acceleration of pulse rate and the rise of temperature were very transient.

Clinical reports, however, continue to be very favorable to the new treatment. The report of the American Pediatric Society, which was one of the most important ones of last year, includes returns from 615 physicians, of which number over 600 express themselves heartily in favor of the serum treatment. And early in the year a joint report from six medical superintendents of as many different hospitals, concludes as follows: "Antitoxin is a remedy of greater value than any other with which we are acquainted."

After all, it is the practical test which must decide whether any measure shall stand or fall. Statistics are often misleading, and we are prone to agree with the old Scotch professor (quoted recently by the *Medical Record*) "that they are like

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sausages: it all depends upon the old woman who makes them." The objector can always find plenty of figures to bolster up his assertions. A good example of this can be found in the latest edition of the Encyclopedia Britanica under the caption of Vaccination. Although a full century has been rounded out since Jenner gave his discovery to the world, this article, bristling with figures and statistics, is a complete refutation of the whole theory and practice of vaccination. Still our faith remains firm.

The adherents of the antitoxin treatment of diphtheria believe that where it fails to ameliorate or cure the disease, there are other poisons at work against which the diphtheria serum is powerless. In other words, the virulence is due to a mixed infection. This seems to have been proved by a bacteriological examination of nine fatal cases of diphtheria in which antitoxin was of no avail. Dr. Stokes reports these results in the *Boston Medical Journal* of December 12, 1895, as follows: In all of the nine cases he found the Klebs-Lœffler bacillus in the respiratory tracts. In eight cases there were well marked traces of pyogenic cocci in the blood. In five there were streptococci in the liver, spleen, heart, and kidneys. In two there were pneumococci in the spleen; and in all of the cases the lungs had the bacteria of diptheria, streptococci, pneumococci, and staphylococcus pyogenes aureus, either alone or in combination.

Thus, it would seem, that if we are to be successful in the treatment of a disease so manifestly complex, we must have a serum which will act against all of these pathological elements. Already much progress has been made in this direction, and experiments are being made with serums against every disease and pathological condition which is known or suspected to be caused by a germ or specific poison. The success attending these efforts have, so far, been varied: in some diseases the results are very flattering, in some only slight, and in some they are nil. Among the diseases in which good results have followed serum treatment may be mentioned typhus fever, tetanus, syphilis, and the streptococcus infections, puerperal fever, angina, and erysipelas; and, of course, diphtheria. Not

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very promising results have yet been obtained in rabies, tuberculosis, typhoid fever, pneumonia or cancer.

It is interesting to note that in primary syphilis two lines of experiments have been tried, and with a measure of success at least, in each. First, serum from the blood of individuals in the third stage of the disease was injected into patients having a primary sore, or sore throat, and although the secondary signs could not be prevented, all of the primary symptoms were very much ameliorated. The other line of experimentation rests on the theory that since syphilis cannot be inoculated into the lower animals, there must exist in the blood of these animals some property which is antagonistic to the disease. The blood-serum of dogs and sheep has been thus used with some degree of success.

The best encouragement given by serum therapy, aside from its use in diphtheria, comes from India in reports of the treatment of the Bubonic Plague. Yersin has been studying the plague in India and China. His first efforts were rather discouraging from the fact that he used antitoxin sent to him from Paris. Fearing the possibility of introducing the plague into Europe, the Pasteur Institute had used dead cultures in immunizing their horses, and the antitoxin was too weak. Later, Yersin made the antitoxin himself with living cultures, and the results were better. He found that the death rate was eighty per cent, and under his treatment, the number of cases being of course limited, the percentage fell to forty-nine. Still later, in China, where he had better facilities, the death rate dropped to seven per cent. Here we have one of the greatest possible triumphs for the new remedy; for Yersin has proved that, though to be effective curatively the antitoxin must be used in the very earliest stages of the disease, its power to protect is fully equal to its power to cure; and while it may not be possible to save the hordes of Asia from the ravages of the plague, it will be possible to prevent it from ever gaining a foothold in Europe and America.

In the *Nineteenth Century* for August, Prince Krapotkin contributes an intensely interesting paper upon the use of serum therapy in snakebite. Since 20,000 lives are lost annually

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in India alone from this cause, it is of no slight importance that a remedy should be found able to combat this fruitful cause of death. As early as 1888 it had become known through the researches of Kaufman, that animals could be rendered capable of resisting the action of snake venom, if the same kind of poison were injected into their tissues in very small doses repeatedly. Following in that line, Dr. Calmette has produced an antitoxin which has proved wonderfully effective. He used the venom of the cobra, and attenuating it by heat, injected small quantities into rabbits. After some time the rabbits were so protected that each one could receive, without disturbance, enough pure cobra poison to kill eighty not so protected. The serum from the blood of the immune animal was then found to be curative. Later he immunized donkeys in the same way. The Pasteur Institute at Lille, France, now prepares the cobra serum in large quantities, for it has been found that it is curative against all other snakebites; twelve cures are reported, where, in every case the snake was killed and its species determined, and in every case there was an undoubted wound sufficient to have caused death. Among the twelve cases are the following:

In January, 1896, a lot of cobras were sent to the laboratory at Saigon in order that the venom might be extracted and used in the manufacture of antitoxin. They were all hungry, and hence all the more vicious. In opening the boxes one of the young men of the laboratory was bitten on the hand. Immediately his hand and forearm became paralyzed. It was a full hour before the antitoxin could be used, but, although the young man spent a restless night, he was working in the laboratory as usual the next day.

In October, 1896, a girl while picking cotton near Cairo, Egypt, was bitten in the forearm by a snake between three and four o'clock in the afternoon. At 7 P. M. she was brought to the hospital in a state of collapse. The pulse was hardly felt at all, and the pupil of the eye showed no reaction to light. Twenty c. c. of the serum was injected under the skin in the abdominal region. At 11 o'clock some signs of improvement were seen, and 10 c. c. more were then injected. The next day

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she remained drowsy, but on the third day she was practically well.

In a like manner a man in Guinea was saved after a bite from a black *naja*, a soldier in Martinique, who was stung by the dreaded *fer-de-lance*, and a man in India who was struck by a *krait*.

DISCUSSION.

DR. CHAS. H. MINER.—The results obtained in a number of children's asylums and hospitals in New York by the use of diphtheria antitoxin in preventing the development of diphtheria, have been so favorable that they encourage the hope that a general use of antitoxin for immunization will, to a large extent, limit the spread of the disease. At the Nursery and Child's Hospital, in the three weeks preceding April 18th, 1895, there were 15 cases of diphtheria. Upon that day 136 children, varying in age from three weeks to four years, were immunized by receiving from 50 to 200 units each. The children showed no bad effects from the injections. A temporary rise in temperature occurred in one-fourth of them, which lasted from six to twelve hours. From the day of the injections no case of diphtheria occurred in the institution for a period of six months thereafter, with two very interesting exceptions, a physician and a nurse who had not been immunized.

At the Mount Vernon branch of the New York Infant Asylum a case of diphtheria developed on February 18, 1894. Cases continued to develop from time to time, so that in September alone fourteen cases occurred. From that time until January 14th there was hardly a day in which a case did not develop. On January 16th and 17th, 221 children were each injected with from 100 to 200 units of von Behring's serum. No bad effects were seen, and during the next month but one case of diphtheria developed; this was on the 14th day. From February 22d to 27th five cases appeared, and the children were again immunized. This time they each received from 125 to 225 units of a serum prepared under the direction of the New York City Health Department.

No cases appeared after the second immunizations for a period of five weeks. A case developed on May 3d and one on May 27th. The hospital has remained since then free of diphtheria, so that no third general immunization has been thought necessary,

At the House of Reception of the New York Catholic Protectory two cases of diphtheria developed on July 7th and three cases on July 8th, 1895. On July 9th and 10th the remaining

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67 children were injected with 150 to 600 units each. (The children's ages varied between two and a half and fifteen years.) No diphtheria developed after the injections in any of these children. Although in these institutions it was impossible to say that any special child would develop diphtheria, still it was an absolute certainty that in each of these institutions more cases would have developed unless in some way the children could be immunized. About one-sixth of the children had albuminuria. In none, however, were there any other symptoms pointing to any deleterious action on the kidneys, and in none was the albuminuria more than transitory.

Dr. Pasani, sanitary officer of Bariulla, in the province of Bologna, Italy, has published an article on an epidemic of diphtheria which broke out in the above town, which was arrested by preventive injections of anti-diphtherial serum. He states that the outbreak developed amongst a population of 5,500 in the worst possible hygienic and dietetic conditions. The first case occurred toward the end of October, 1896, and 57 others followed. He treated all cases with antitoxin, and there were five deaths; equal to a mortality of 8.6 per cent. The epidemic continued, sometimes lessening, at others increasing, nothwithstanding the adoption of severe prophylactic measures—isolation, disinfection, closure of the schools for a time, etc. He, therefore, with the consent and at the expense of the municipal authorities, had recourse to preventive injections on a large scale. These injections were made on four-fifths of the children of the poor, between one and twelve years of age, and the result demonstrated very clearly their value, both as regards the immunizing power of the serum and the duration of the immunity. When the epidemic was at its height he inoculated 260 children. From the second day (February 2d, 1897) following the injections up to May 15th, when he wrote the article, only two cases of diphtheria had taken place among them. Both cases were very slight; one occurred ten days and the other two months after the injections. On the other hand, fifteen cases of diphtheria and primary croup occurred between February 2d and May 15th among the children not subjected to the preventive treatment. The dose up to two years of age was 100 units; from two to eight years, 200 units, and from eight to twelve years, 300 units. To save time, owing to his having to inoculate such a large number, he injected the serum into the antero-external part of the arm. He sometimes noticed a cutaneous eruption around the inoculated point, and at others a slight œdema with a little pain, which disappeared in a day or two.

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Dr. William H. Park, of the New York City Health Department, has made a summary of cases reported in the journals immunized by antitoxin. Total cases immunized, 16,576; antitoxin units used, 50 to 100 (usually 150 to 200); attacked within 30 days, 129, mild, all recovered; attacked after 30 days, 20, mild, all recovered, with no serious after-effects observed which could be ascribed to the antitoxin injected.

Thus we see by the use of antitoxin it has been possible to stamp out completely diphtheria in four great institutions and to stop an epidemic in a town of 5000 inhabitants. The duration of immunity in many cases is apparently not more than thirty days, but it may be for a much longer time. The doses required to confer immunity are probably between 50 and 300 antitoxin units, according to the age of the individual treated.

When in Berlin during March, 1896, I saw the treatment of scarlatina with Marmonk's antistreptococcic serum. The assistant who was treating the patients told us that he was not very favorably impressed with the results. Recently Prof. Baginsky has made a rather favorable report of his results. He says that antistreptococcic serum has no effect on scarlatina, properly so-called, but merely prevents the development of complications of the disease, such as sore throat, nephritis, otitis, etc.

Among twenty-seven children there were no deaths and no serious complications, the sore throat which they presented subsiding within from three to five days, as did also the swelling of the glands; the glands, however, were treated by topical applications of iodine ointment.

In sixteen other patients the serum produced no perceptible effect and several of them died in spite of the administration of large doses thereof; others developed suppurating adenitis.

In another group of five children the serum was employed in order to combat a complication which already existed. In these cases it appeared to have a favorable effect, but they are too few in number to justify any conclusions on the subject. One thing is certain, that before the use of Marmonk's serum the death-rate from scarlatina was between 22 and 24 per cent., whereas, since this new treatment has been resorted to, it has been only 14 per cent.

These statistics, it is true, are based on too small a number of cases (48 with 7 deaths) to warrant the assertion that the lowering of the death rate is due to the use of the antistreptococcic serum. The dose of the serum employed for an injection was 10 cubic centimeters, the total quantity injected into each child being from 10 to 70 c. c.

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THE PROPOSED SANITARIUM FOR TUBERCULOSIS AT WHITE HAVEN,

TOGETHER WITH SOME OF THE REASONS WHY THE STATE SHOULD LEND ITS AID.

BY F. C. JOHNSON, M. D., WILKES-BARRE, PA.

READ OCTOBER 6, 1897.

Mr. President and members of the Luzerne County Medical Society:

Not being engaged in the practice of medicine it would be presumptuous for me to address this learned body on a technical topic, and I shall not attempt to do so. My theme will be treated from the standpoint of a layman rather than from that of a professional man, though availing myself of some observations of recent writers as may serve a useful purpose.

The question, Shall Luzerne county have a sanitarium for the treatment of tuberculosis, is a most interesting one and if its consideration on this occasion should be the beginning of a local movement towards the desired end, I should feel that the assignment of a paper to me had not been a mistake. I have become interested in the subject myself through acquaintance with Philadelphia physicians who constitute the Pennsylvania Society for the Prevention of Tuberculosis. That organization has been working since 1892 on the idea that there should be established within our state, sanitariums for the treatment of tuberculosis, as the members believe that we have locations which are admirably adapted for the purpose and such as would make it possible to help many whose circumstances will not permit them to go to more distant regions of the west or south or north which have become noted in the treatment of tuberculosis. The idea is growing that nature has been more lavish with her favored locations than was formerly supposed. It stands to reason that if the great system of mountains which passes through the eastern portion of the United States is curative of consumption at the terminal points in Tennessee and the Adirondacks, it is probably just as curative in the middle

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portion of the system as represented by the mountains of Pennsylvania. And observations show that the mountains of Pennsylvania, *are* helpful in the treatment of consumption. Our own mountains have an advantage for our people on the ground that sufferers ought to seek treatment in the climate in which they expect to live. I know of an eastern physician who went to Denver suffering with tuberculosis and who has experienced such a degree of improvement that he has been able to practice his profession there for several years with comfort. He has made visits east on two occasions, but each time he was seized with hemorrhages and other distressing symptoms and was compelled to hurry back to Denver with the greatest speed. So for Pennsylvania people who have not the means to live in the Rocky Mountains or other distant regions, our Pennsylvania mountains ought to be their choice. The society to which reference has been made has endeavored to formulate a plan by which such sanitariums as have been successful elsewhere may be established within the borders of our great commonwealth, where we have an abundance of sunlight, ozone and what has been called the healing breath of the pine. True, the pine forests of Luzerne county and other counties of Pennsylvania have largely disappeared beneath the woodman's ax, but they are not all gone and the same air and soil which gave them birth are here either to renew them or to renew the conditions which gave them their curative virtues.

The Society for the Prevention of Tuberculosis, being made up largely of Philadelphia people, they naturally sought to locate the sanitarium where it would be accessible to them, and at the same time convenient to the people of the entire state. Tracts of land were offered either free or at a low price in several localities. One region which specially pressed its claim was the Pocono in Monroe county, where the conditions were perhaps as favorable as any. I happened to be present at the meeting in Philadelphia some months ago at the College of Physicians and Surgeons, of the Pocono delegation and the projectors of the sanitarium. They were armed with statistics as to the temperature, rainfall, prevailing winds, etc., and made a very creditable showing, but being approached by only a

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single railroad, the Delaware, Lackawanna & Western, it was not considered the most desirable location.

Attention was at the same time directed to Luzerne county and a visit was made here by Dr. Lawrence F. Flick and Dr. Guy Hinsdale, officers of the Pennsylvania Society for the Prevention of Tuberculosis, and of the American Climatological Association, Dr. Benjamin Lee, secretary of the State Board of Health, and Dr. T. A. Knopf of New York City, a distinguished member of various societies at home and abroad. Through the courtesy of the Lehigh Valley railroad company a special train was placed at their disposal, and accompanied by Dr. S. W. Trimmer, Superintendent Alexander Mitchell, and Joseph E. Patterson, they were enabled to visit what seemed available sites near White Haven, Glen Summit and Bear Creek. Mr. Patterson pointed out an eminence a little more than a mile from Glen Summit, some twenty-one hundred feet above the ocean, and three or four hundred feet higher than Glen Summit, and having much to recommend it, but the location which most impressed the visitors was on Green mountain, which is immediately adjacent to White Haven—in fact it dips down into the borough. Here is a tract of several hundred acres belonging to Dr. Trimmer, which he kindly said, through the co-operation of citizens of White Haven, could be devoted to the purposes of the society free of cost. All agreed that it was an ideal location both by reason of its natural advantages and the fact that Luzerne county is touched by all the great railroad systems of the state, and they accordingly took steps to organize the movement.

To this end state aid was necessary, as none of the projectors were men of wealth, and as the proposed institution was to be for the benefit of the people—people who could not afford to seek treatment in any of the regions to which consumptives are usually sent—a bill was drawn for presentation to the legislature, and as all bills for charitable appropriation must be first passed on by the Board of Public Charities, it was submitted to them asking for one hundred and fifty thousand dollars. The memorialists appeared before the Board of Charities and forcibly argued the proposition that the state owed to itself

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the duty of assisting the consumptive poor—a form of benevolence that would do a far greater amount of good than merely assisting suffering individuals, and which would protect the state in some degree from the ravages of the spread of tuberculosis from the sick to the well. The board considered the appeal, but while willing to make a small appropriation by way of a beginning, was not willing to make very much of an inroad into the funds of the state. They did, however, recommend an appropriation of something like thirty thousand dollars, but attached the condition that the projectors should raise a like amount from private subscriptions. This was naturally a dampener on their plans, but when they got before the appropriation committee at Harrisburg they could not get even this. In vain did they plead that if it was proper for the state to make appropriations for hospitals of various kinds, it was eminently proper to make some provision for the consumptive poor. In the general hospitals the benefit was largely to the individuals —for surgical cases did not breed accidents, nor did insanity spread through a community, but consumption knew no limitation, and being an infectious disease, it was eminently proper for the state to take the lead in preventing its spread. It was shown that while leprosy, small-pox and diphtheria had either been banished or limited in their spread, tuberculosis still claims one-fourth of all the deaths for her own. It was shown that Germany was particularly active in efforts to stamp out tuberculosis, there being in that country no less than forty-one distinct movements for the eradication of the disease. Some of these movements in Germany are led by members of the Royal Family and are supported alike by representatives of capital and the working classes.

But arguments were in vain and the measure did not get through the committee, and unless aid can be had from private charity the project will have to wait for the next legislature a year hence. But if the project be as truly meritorious as it seems to the projectors it ought not to be compelled to wait for such an uncertainty as expected aid from a legislature, but ought to be inaugurated by private charity and given such a tangible existence as to command the attention from those who

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dispense the bounty of the state. If the project can be begun, even on a very limited scale, if it can be shown to have an existence other than that in the minds of the projectors, and it can be demonstrated that it is doing a good work in a hitherto untried field, it will stand a fair prospect of receiving recognition by the next appropriation committee.

If this paper to-night should start an interest that would lead to an active coöperation of this society and of the people of Luzerne county, I would be gratified indeed. Legislatures do not take up new and untried projects with much generosity, nor is to be expected that they would or should, but when they have assumed definite and tangible shape and are backed by an intelligent and proper public demand the aid is usually not withheld. Such an institution would be helpful to all in the commonwealth, and we in Luzerne county would, by reason of our nearness, be specially favored for receiving the state's bounty, and if after careful consideration it should commend itself to our judgment our people could aid very largely in that public pressure which helps to bring about state help.

Given a moderate elevation, pure air and water, proper protection from winds, a porous soil, a minimum of humidity and a maximum of sunshine, and you have a suitable locality to which consumptives may repair with the hope of finding improvement and in some cases cure. Oxygen and sunshine are nature's disinfectants, and of all diseases tuberculosis is pre-eminently the one which requires measures disinfectant in character. Such persons as have examined the proposed sanitarium site at White Haven, believe that it meets the requirements. As to elevation, it is about twelve hundred and twenty-five feet above the sea, and about one hundred feet higher than the track of the Lehigh Valley railroad which at White Haven is eleven hundred and twenty-four feet. The railroad is perhaps fifty feet above the Lehigh river. Green mountain rises gently from the borough of White Haven until at an elevation of one hundred feet above the town it forms a plateau a few hundred feet in width, stretching westward indefinitely. It is on this plateau that it is desired to locate the sanitarium. The

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prevailing winds of this locality are northwest, and the sanitarium would be protected from them by Green mountain, which rises rather abruptly from the plateau some four hundred feet, and passes westward continuously with the plateau. It thus affords admirable shelter from the wind. The sun exposure is all that could be desired. The outlook is to the south and the plateau is bathed continuously with sunshine (whenever there is sunshine) from daylight to dark. The view is out over a wide stretch of wilderness, east, west and south, and from the top of Green mountain there is a charming prospect toward every point of the compass.

The soil is porous and rains, however heavy, are speedily carried down the declivity or so thoroughly removed by percolation as to prevent the rendering of the atmosphere humid, as it would be under other circumstances. With the exception of a clearing on the plateau, which is occupied as a farm, the mountain side is wooded, and there are innumerable shady nooks where relief from the beating sun can be had if desired. It is the natural home of the pine, though the extensive lumbering operations which brought White Haven into being have long since led to almost an entire disappearance of this beneficent tree, whose varied products have by some strange chemistry of nature ever been found to be so healing in affections of the respiratory tract. The pine has been largely replaced by oak and chestnut and other deciduous trees, but there are yet enough left to show that it was once a region where pine, hemlock and spruce and balsam flourished, and thus suggesting that the same natural conditions which gave rise to these salutary evergreens are still present to breathe out their healing influences on those who seek them. For purity of atmosphere the locality is up to a high standard and it is pronounced practically free from miasmatic and malarial influence. Dr. Trimmer, who has practiced there forty-two years, says that the locality is remarkably free from tuberculous diseases.

The condition of dry atmosphere is fairly present. The fogs are not frequent nor are they extensive or continuous. They mostly originate in the condensation which takes place in the moisture arising from the river, but they do not last long nor

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do they usually reach to the plateau. The region abounds in fine drives to Bear Creek, Glen Summit and other mountain resorts, and instead of being remote from postoffice, telegraph, railway, churches, stores, doctors, etc., it is immediately adjacent to White Haven, a charming borough made up of agreeable, educated and progressive people, all of which would be factors in making patients feel contented in their enforced absence from home.

Let us now pass to some general considerations showing why the state should take up the matter of combatting tuberculosis.

First. It would be a measure of public economy. Consumption is the greatest scourge of the human race, but the fact that it is so constantly and noiselessly present does not awaken public alarm and the state does not feel any responsibility, though the state has very properly taken up the subject of the spreading of tuberculosis through the milk supply and has applied treatment of the most heroic kind. In the city of Philadelphia alone there are at least 6,000 consumptives all the time and the number of deaths is fully 2,500 yearly. Pennsylvania has 20,000 cases all the time. The presence of a leper in New York City causes the people to shudder, but a disease much more infectious than leprosy and of which about 6,000 people die yearly in that city excites no great alarm. When yellow fever or cholera invade our shores there is almost a panic of public fear and the state does not count the cost in fighting the dread foe, yet we have consumption with us all the time and every victim is a focus from which the malady may spread to his fellows. Both cholera and yellow fever and even the bubonic plague have their limitations beyond which they will not pass, but tuberculosis has no limitations except those that man puts around it through prophylactic measures of the individual and of the state.

Second. While the greatest scourge of the human race, tuberculosis is to a certain extent preventable, and restriction becomes an economic measure. It is this fact that renders it necessary for the state to interfere by both caring for the sick and by insisting on prevention. Individuals and societies can

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do much, but the state must go further and use the same degree of compulsion as she does in enforcing quarantine regulations when threatened with pestilence from abroad. While it is probably too much to say that the state should isolate consumptives and compel them to live apart from their fellows like the lepers of old, yet the state could well afford to lend itself to such a campaign of education on the subject of the methods by which tuberculosis is spread as would enable every infected individual to quarantine himself, by seeing that such measures were employed as would prevent him from being a center of infection.

It is a great comfort, not possessed by our fathers, to be assured that tuberculosis is not necessarily hereditary and that though we may not absolutely prevent it, it is at least capable of great restriction. There is little doubt that the virus resides wholly in the secretions affected. Therefore it seems possible to restrict the propagation of the disease with more certainty and with less inconvenience to the affected and their friends than in any other infectious disease. To secure such restriction the people must be taught the nature of tuberculosis, the methods of its propagation and how best to control it. This instruction must extend to members of city governments, owners of public halls, and public passenger conveyances. And ultimately, if it should be found that the people cannot be trusted to work out the problem, it may be necessary for the state to intervene by preventing the tuberculous (perhaps also the insane and the degenerate) as far as possible from procreating their kind.

Third. The state should recognize the fact that unless tuberculosis be restricted it spreads; and the state should undertake to impress upon the people that it depends upon them whether it shall spread or not. They should be taught that this dread malady is capable of control, and to know that by protecting their stricken friends they are protecting themselves. With the ignorant poor and the wilfully careless and the vicious, enforced isolation may be necessary.

If consumptives are permitted to roam at will regardless of their personal habits and spitting everywhere, they do great harm. Heretofore there have been no restrictions on the

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individual and it is now reported that regions like Colorado and California, where tuberculosis was formerly unheard of, have become infected by tuberculous seekers after health, and that now the natives are contracting the disease. It is probable that this report of the infection of Colorado is exaggerated. Dr. Gardner of Colorado Springs has a paper in the recent proceedings of the American Climatological Society in which he claims that there has been no such infection. And he supports his claim with statistics. This statement of Dr. Gardner corroborates recent observations abroad. In the villages where the largest two sanitariums of Germany are located, Gœrbersdorf and Falkenstein, the mortality from tuberculosis among the inhabitants has actually decreased, being now one-third less than before the establishment of those institutions. This is strong evidence that well conducted sanitariums for consumptives are not centers of infection.

If whole regions can become infected, how much more easily can sleeping cars and public streets and houses and stores become the scene of abiding infection. When we travel in the west and hear consumptives coughing all night in the ill-ventilated sleeping cars with ourselves, and see the porter make the beds next morning, there is no great feeling of assurance as to safety. True, the porter changes all the linen, but the blankets, which are admirably adapted as culture grounds of the tubercle bacilli, are folded up without exposure to sun or air and jammed into tight compartments, from which they will not be taken until the berths are made up the next night. It will be a matter proper for legislation, compelling sleeping car companies to fumigate their bedding daily. This experience, which is familiar to every traveler, recalls the fact that Dr. Ghion, a former medical director of the U. S. Army, said that he was never in such constant fear for his life, not even in the midst of an epidemic of yellow fever, as he was on a journey from New York to Florida by steamer in a throng of expectorating consumptives going south for their health. Dr. Hance, in the *Medical Record* of December 28, 1895, gives somes observations made by him at the Adirondack cottage sanitariums that may serve to dispel some of the fears of the

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danger of contracting tuberculosis by mere contact with patients suffering from this disease. He says "Needless prejudice has no doubt been aroused by ignorance of the precise manner in which tuberculosis may be communicated, and hardship entailed on the unfortunate subjects. We know that hospitals, private dwellings and public conveyances do become infected, but it is doubtful if the patient infects by mere contact, much less by his breath. It is through the sputum, when dried and distributed through the air, that the chief mode of infection operates."

For two months Tappiner (Archiv. Med., bd. xxxix) caused a woman with advanced consumption to cough through an opening into a wooden box in which were two guinea pigs. At the end of that time, on being killed, they were found to be sound.

Dr. Hance reports that of the eighteen cottages in the Adirondack sanitarium some had been occupied eleven years. The dust was gathered from all of them and guinea pigs inoculated with it. All of the cottages but one were found to be absolutely free from infectious material.

These observations of Dr. Hance corroborate those made in Europe by Cornet. He inoculated animals with dust from wards in which consumptives were treated, and he found that in no case was the dust infected when gathered from rooms where sputum cups and spittoons were used exclusively.

All of which goes to demonstrate that if the people could once be properly educated on the importance of individual disinfection, the ravages of tuberculosis could be greatly reduced and ultimately as well controlled as small pox has been since vaccination has come into use. But it is too big a problem to be left to the whim of the individual, and can only be fought by organization backed up by the power of the state.

Fourth. The state, in considering this great problem, does not have to depend on theories alone, but there is even now a fund of practical experience from which to draw. Already we are beginning to feel the good effect of the campaign of education begun so admirably by the physicians of the country, for all intelligent practitioners are now missionaries in this cause, or if they are not, they ought to be.

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The city of Philadelphia is showing a marked response to the efforts made to lower the death rate from tuberculosis. Notwithstanding its growth in population, the actual number of deaths from pulmonary tuberculosis has gradually diminished since 1880. In 1870 there were 342 deaths from pulmonary tuberculosis in each 100,000 of population, while in 1894 the mortality had dropped to 220, a very gratifying decrease. In New York State the ratio has also materially decreased. Knopf states that the results obtained in sanitariums devoted exclusively to the treatment of consumption are as follows:

14% absolute cures.
14% relative cures.
42% ameliorations.

Thus, through the establishment of state or city institutions for the treatment of the curable tuberculous cases and for the isolation of the hopeless ones, the commonwealth would be the gainer in the end. Thousands of dollars are now expended in general hospitals for tuberculous patients who not only cannot be properly treated, but are at the same time a constant menace to other patients suffering from acute diseases. For the same expenditure a goodly number could be cured and centers of infection forever done away with. Should not the state afford to the honest but tuberculous workingman the chance of being one of the 28% who can be restored to his family—a bread-winner and a support of his family? These facts are significant of the change that has come over the profession in the manner of looking at the disease and of treating it, and also of the attitude of the public itself, which is rousing from its long indifference. The people need plain teaching on this point, for most of them cling to the traditional idea that tuberculosis is strictly a hereditary disease, and consequently unpreventable. The large majority of people do not yet believe that it is contagious, and although, when requested, some persons may observe some of the sanitary precautions which are advised, they do so often in a perfunctory manner. Greater efforts must be made to reach the people.

Recognizing that the consumption of meat and milk from

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tuberculous animals is one of the frequent sources and modes of tuberculous infection of the human being, especially of bottle-fed infants and children of tender age, the Pennsylvania Society decided to urge upon the legislature of the state the necessity of the early enactment of laws to secure the exclusion of the meat and milk of tuberculous animals from this commonwealth. Under these laws hundreds of living cattle and a large number of fresh carcasses have been condemned as unfit for the dairy and the market.

We now have a State Live-stock Sanitary Board, composed of the Governor, the Secretary of Agriculture, a Dairy and Food Commissioner, and the State Veterinarian. To administer this law appropriations have been placed at the disposal of the Live-stock Sanitary Board for dealing with the various contagious and infectious diseases, and for the first time in the history of Pennsylvania there is seen a conservative and systematic plan of dealing with these diseases.

Similar conservative action in the direction of preventing the spread of the infection from the sick to the well by means of sanitariums would be equally wise and conservative, and the one is just as necessary as the other.

The work of educating the public has been well begun by the Society for the Prevention of Tuberculosis, which has widely distributed tracts, entitled "How to Avoid Contracting Tuberculosis," "How Persons Suffering from Tuberculosis Can Avoid Giving the Disease to Others," "How Hotel Keepers Can Aid in Preventing the Spread of Tuberculosis." A great interest has been taken in the Society by physicians in all parts of the world. Boards of health in almost every state in the union have made application for these tracts, and have been supplied. There have come requests from Boston, San Francisco, and other cities, and physicians in all parts of the South and West, in various portions of Canada, and even far as the Hawaiian Islands, have made application for them.

Fifth. The tuberculous poor are dependent on the state, and it is the duty of the state to recognize this dependency and provide them with a more wholesome environment. In speaking of this point the Cincinnati *Lancet* says:

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In every community there are found persons who are suffering from tuberculosis either not receiving any treatment or not receiving approved treatment, and who are actively spreading the disease. Many of them are incapacitated from earning their living and must become a burden either to their friends or to the great foster-mother of those who have no friends—the state. The state is the one who should not only provide this particularly unfortunate class with food and shelter and medicine, as she does her other sick, but she should hedge them about with such restrictions as would tend to the extermination of the disease.

The state should not delay the inauguration of the work. While several institutions would be required in so large a commonwealth as Pennsylvania, the establishment of a single one would be a good beginning, and others could be added as circumstances should require.

Sixth. There is abundant encouragement for the making of these efforts. Reference has already been made to the diminishing death rate in New York and Philadelphia. People are beginning to learn that the disease, though distressing, is not necessarily hopeless. The patient, in battling for his life under the present rational methods, is stimulated by the knowledge that in helping himself he is helping others, by preventing the stream, so far as he is concerned, from becoming poisoned at the fountain head, and he gains fresh courage every day when he realizes that he is aiding in stamping out, not only his own sickness, but the disease in general. The thought that a man may infect the dear ones of his family is calculated to make him melancholy and to depress his vitality to such an extent as to hasten the progress of his disease. But when he is assured that, by extreme care on his part, they will not necessarily be exposed, his mind becomes at ease. And so when children learn that they have not necessarily inherited consumption from a parent who was a victim of that disease, an incalculable burden is lifted off their young lives, and instead of yielding to the idea that they are fated to become victims as were their fathers or mothers, their hearts rebound after the discovery of their freedom from the blight of fate, and they labor diligently and gladly to so train their bodily powers as

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to escape the evil influence which in a less favorable environment surrounded their parents. To tell a person that he has consumption is no longer considered pronouncing a death sentence, as modern statistics show a recovery of 50% of cases detected early.

A person with bacteriological or other evidence of tubercular consumption ought to be made aware of it. To tell him is to deal a heavy blow, but when once he rallies from the mental shock and learns that he has a fighting chance for recovery, he will apply himself to the proper measures. But if the fact that he is infected be passed lightly over as a heavy cold or a bronchial trouble, it will soothe him and his family, though only for a time, and the day of reckoning will come, and when it comes the most favorable period of treatment will have passed, and it may be too late. He is entitled to every chance there is.

In these days when the germ theory is made so prominent, we tremble at the knowledge that bacteria are everywhere—in our food and drink and in the very air we breathe. But it is gratifying to be assured that most of them are harmless; and that those which are not harmless, like the bacilli of tuberculosis and cholera and yellow fever and typhoid fever, are destroyed in the oxidyzing processes of the body unless they find lodgment in those who are susceptible. Not only does the digestive process destroy the germs, but we are assured (Hinsdale on Infected Atmosphere) that the cells of the respiratory tract protect the majority by a peculiar bactericidal power. And when the human race comes to realize *in its fullness* what Pasteur laid down as a proposition some thirty years ago, that "Man has it in his power to banish parasitic diseases from the earth," then will be begun a warfare besides which all the petty conflicts between man and man will pale into insignificance.

The argument for state interference may be briefly summarized thus:

Tuberculosis is the greatest scourge known, and it will be economy to restrict it.

It can be controlled under proper restrictions, and the public good demands such restriction.

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Under favorable conditions consumption can be cured, and the poor are entitled to a chance.

One consumptive individual infects his fellows.

By curing the curable and placing the incurable under hygienic surroundings the individual centers of infection are destroyed or diminished.

It is too big a task for individual enterprise to undertake alone, and deserves to be aided by state or national measures.

The state should intervene just as it does to repel yellow fever or cholera, for the ravages of tuberculosis are greater than both.

The state should help by erecting special hospitals and by educating the people on the character and proper care of the malady.

The work of combating consumption is not theoretical, but experience proves that rational measures and a distribution of information have largely reduced the mortality in New York city, Philadelphia and elsewhere.

And now, having outlined the project for locating a sanitarium in our county, and having advanced some of the reasons why the state should take up such a movement, I will close by reading two letters which I have received from Philadelphia physicians. I also append to this paper the weather report as made by Mr. Charles M. Driggs, of White Haven, during the last three years.

LETTER FROM DR. HINDSDALE.

DIFFICULTIES IN CARING FOR CONSUMPTIVES.

The first difficulty is the immense number of persons suffering from tuberculosis. Even if we consider those who actually die of this disease each year we find that for the state of Pennsylvania it is an army equal in numbers to that of our National Guard. What consternation would ensue, what measures would not be undertaken, if we might suppose the disease to cease for ten years and then be restored in its full measure of mortality.

The second element of difficulty is the apathy of our people. They have not begun to grasp the idea that tuberculosis is one of the preventable diseases. They look upon the mortality from phthisis as a part of an inevitable tribute to death that

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must be paid because it always has been paid with such a remarkable regularity that one is able to foretell very closely just how many will die of phthisis in the year. We know now, and we were morally certain at the opening of the year, that in Philadelphia about 2,400 would die of phthisis in 1897. But in Philadelphia the rate has fallen gradually so that, whereas, fifteen years ago about fourteen per cent. of all deaths were from phthisis now only about ten per cent. were from that cause. The reason is that, as in other warfare, "To know the enemy is half the battle." So the fuller knowledge of the way in which the disease is propagated from the sick to the well enables us in some measure to avoid distributing broadcast the germs of the disease, and, on the other hand, to avoid receiving them with a strange indifference which does not seem to exist in our relations to other diseases. An institution for the scientific treatment of tuberculosis is a great object lesson on the means of prevention of the spread of the disease as well as its cure. The sanitariums in the Adirondack mountains, at Chestnut Hill in Philadelphia, in England, the Isle of Wight, and on the continent of Europe, by exerting a strict supervision of their patients, teach them how the disease can be managed and the dangers of its communication destroyed. So it would be with an institution of this kind if established in any locality. Those who go out relieved or cured would aid in all measures calculated to diminish the disease.

But the State of Pennsylvania seems to be unwilling or unable to undertake for itself or to assist in any very considerable degree such preventive and curative measures. And here comes the third obstacle—

THE COST of carrying out plans for the treatment of the consumptive poor of our state. Although the appeal has been made to two legislatures no funds have been provided for the establishment of a State Hospital for Tuberculosis or to aid any new institution that should be proposed.

The resources of the state go to existing institutions as far as appropriations for charitable purposes are concerned. They must be devoted to the care of the indigent insane, the almshouses, the miner's hospitals and the private hospitals in various cities, and last, and not least, to the hospitals belonging to different medical colleges whose managers impress upon the members of the legislature the urgent need of their institutions. It is needless to say that the competition of medical schools leads them to gather into the wards and the clinics vast numbers of those who have no proper claim for charity, and thus it happens that the funds of the state are ultimately used for

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the care, the feeding and the treatment of very large numbers of people whose circumstances do not warrant this misuse of state funds.

The state's money ought not to build wards and maintain hospitals where the well-to-do from all over the United States may come and take private rooms, the existence of which is made possible by annual appropriations from our legislature. It thus happens that the sufferers from the most prevalent disease, impoverished by a more or less continued illness, and usually with families dependent upon them drift about our cities with no proper supervision or care and only a small fraction of them gain admittance to our established institutions.

It is the state's clear duty to devise some means of dealing with this large and truly deserving class, and the expenditure of money in this direction would be returned many-fold to the commonwealth by the saving of valuable lives whose usefulness to the state we do not pretend to estimate.

GUY HINSDALE.

LETTER FROM DR. FLICK.

I am very glad that you are going to bring up the subject of a Sanitarium for Consumptives before the Luzerne County Medical Society. The upper end of the Lehigh Valley is one of the most desirable locations in this country for such a sanitarium, and it is therefore quite proper that the medical profession in Luzerne county be awakened to the importance of establishing a sanitarium there. White Haven is especially well situated for the purpose. It offers one of the finest climates in the country for tuberculous subjects and is very accessible to the large centers of population. To my mind nearness to home and accessibility to the best markets are two very important factors in a location for a sanitarium for consumptives. Proximity to a town is also of importance so as to give the friends of patients proper conveniences and facilities when on visits to their stricken ones. Opportunity for patients to go to church and to have recreation must also be considered, and these can only be had near a railroad station and center of population. The vicinity of White Haven is, to my mind, an ideal location for a sanitarium for consumptives, and as far as my personal experience goes and my knowledge of the subject enables me to judge, the most desirable location in Pennsylvania. Our society will make every effort to bring about the establishment of a sanitarium there, and I trust that you will succeed in arousing the medical profession of Luzerne county to the importance of the movement.

Yours fraternally, LAWRENCE F. FLICK.

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U. S. DEPARTMENT OF AGRICULTURE,

WEATHER BUREAU.

Voluntary Observers' Meteorological Record.

STATION—WHITE HAVEN, LUZERNE COUNTY, PA

CHARLES M. DEIGGS, Observer.

MONTH.	TEMPERATURE.			PRECIPITAT'N.		PRE-VAIL'G WINDS.	CHARACTER OF DAY.		
	Max.	Min.	Mean.	Inches.	Snowfall in inc's.		Clear.	Fair.	Cloudy.
1895.									
March . .	57	8	30	.95	12	N	7	15	9
April . . .	80	21	45	4.24	. . .	N	5	12	13
May . .	91	29.5	57.5	2.75	. . .	S	9	17	5
June . . .	93	46.5	68.7	2.22	. . .	S	9	17	4
July . . .	92	41	69.5	2.16	. . .	S	4	21	6
August . .	92	36	69	2.87	. . .	NW	12	17	2
September.	97	35	68.5	1.84	. . .	N	9	16	5
October . .	68	21	43.4	2.67	Trace	N	5	19	7
November .	68	13	40.6	2.95	Trace	S	2	16	12
December .	58	6	31.8	5.39	Trace	S	4	13	14
	97	6	52	28.04	12		66	163	77
1896.									
January .	47	— 5	23	.69	4	S	1	23	7
February .	53	—20	25.9	4.14	13	NW	4	15	10
March . .	62	—13	23.9	5.32	21	NW	4	17	10
April . . .	90	20	51.9	1.00	3	SW	2	22	6
May . . .	90	46	65.2	2.78	. . .	S	4	22	5
June . . .	93	55	68	3.83	. . .	NW	8	15	7
July . .	93	58	73.2	7.60	. . .	S	4	23	4
August . .	100	50	72	2.44	. . .	N	10	21	0
September.	94	40	62	3.71	. . .	N	9	19	2
October . .	72	29	48.6	4.08	. . .	NW	1	23	7
November .	70	19	43.6	5.49	Trace	S	0	20	10
December .	58	— 8	26.9	.87	5.5	N	5	22	4
	100	—20	48.7	41.95	46.8		52	242	72
1897.									
January .	54	— 4	24	1.28	9.3	NW	5	19	7
February .	46	— 7	26.3	1.73	8.5	N	6	14	8
March . .	61	6	34.7	2.22	3.5	S	8	14	9
April . . .	83	19	46.1	3.99	Trace	NW	8	20	2
May . . .	79	35	54.4	6.49	. . .	N	6	19	6
June . . .	88	36	60.5	2.32	. . .	S	6	19	5
July . . .	94	53	70.7	6.49	. . .	S	10	13	8
August . .	87	43	66	3.48	. . .	S	14	15	2
September.	92	31	60.7	1.25	. . .	N	18	8	4
October . .	84	24	51.6	1.75	. . .	S	7	18	6
	94	— 7	. . .	31.	21.1		88	159	57

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DISCUSSION.

DR. GUTHRIE.—To say anything in favor of sanitariums for the management of this disease seems entirely unnecessary after listening to the excellent essay that has just been read.

But it is patent to all that of the twenty thousand cases of tuberculosis in Pennsylvania only a small percentage can be treated in sanitariums. Sanitarium treatment is all right and should receive every encouragement, but what shall we do for this large army of unfortunates that cannot be thus treated? It is important to us and to the community at large that the knowledge gained on this subject should be spread among the people generally.

From the essay I think we may conclude that some points have been undoubtedly demonstrated.

1. That tuberculosis is not necessarily an hereditary disease. I think we may safely say to any young man or woman that, although your father or mother or both may have died of phthisis, it is not necessary that you should die of the same. Formerly the children of tuberculosis parents had this dread ever hanging over them, but, thanks to our present knowledge, this is unnecessary.

2. It is clearly demonstrated that tuberculosis is contagious. I can cite a case from my practice showing most clearly the truth of this proposition. A young woman of splendid physique and perfect health, and whose ancestors were entirely free from the taint of tuberculosis, married rather late in life a man of tubercular tendency. Soon after marriage he developed phthisis, and the wife nursed him through his illness until his death. One year before his death she was delivered of a child, and she and the child subsequently returned to her father's house to live. Soon after she became affected; at first with a cough, then with various other symptoms, and finally, after a terrible conflict of the disease with her rugged constitution, she died.

The autopsy revealed the most extensive changes that I have ever witnessed in any patient. Every organ of the body had been invaded by the disease. The boy is still living, and I believe that, notwithstanding the fact that the father and mother both died of tuberculosis, that boy has a good chance to live. I believe that no sane physician any longer doubts the contagiousness of tuberculosis. It is our duty, then, to guard our patients against it. Recently, in an address which I made before a meeting of dentists, I took the ground that a dentist should be an educated physician the same as any other

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specialist. He should be able at once to recognize tuberculosis, and for his own sake and for the sake of his subsequent patients, use every precaution in sterilizing the instruments used.

There is danger, too, in the public drinking fountain and in the common communion cup.

Persons who have a tubercular tendency should not be allowed to associate with tuberculous patients. Hence such a one should never be a trained nurse. We should educate the community as to the danger of the disease, and educate those who have the disease as to the danger of spreading it, and the percentage of mortality will then be greatly lessened.

DR. S. W. TRIMMER.—I came over especially to-night to hear Dr. Johnson's paper. Its object is to interest people in the establishment of a sanitarium for consumptives. We may not be able to take care of all of the consumptives in Pennsylvania, but at least we ought to take care of the poor. Many are not poor and can be cared for at their homes with all the appliances necessary. With the poor this is not so. Some say the state should deal with its tuberculous patients, as with its insane, and compel them to live in institutions where they can be properly cared for. These cases appeal strongly to our sympathies.

I could cite numerous cases from my practice to show the contagiousness of this disease, though I was formerly sceptical on this point until experience taught me my error.

I had the pleasure of going over the ground with the gentlemen in search of a location for this proposed sanitarium, and I think the one they have selected is almost ideal for this purpose.

DR. FINNEY.—It is the experience of the general practitioner that many of their patients have not the means to properly carry out the treatment desired. This is a disease of malnutrition. Good nutrition is especially needful. An important point is exercise, but as a rule these patients will not exercise at home. In a sanitarium all of these matters can be regulated. There are two forms of tuberculosis, and the incipient form can be cured with proper management.

DR. FARREL.—The great difficulty is, that our patients do not know how to take care of themselves, and many of them cannot follow out directions given. We meet and talk these things over and there it ends. We should also educate our patients. I would suggest that our Secretary write to the Sec-

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retary of the Society for Prevention of Tuberculosis for circulars for distribution among patients, giving directions as to the management of sputa, &c.

DR. TAYLOR stated that such circulars of information could be obtained from the State Board of Health.

Dr. Johnson, in closing, thanked the Society for the interest shown in the subject, and related a case coming under his notice of a child with incipient tuberculosis that had been taken to Glen Summit last winter with very beneficial result.

HÆMATOZOON MALARIÆ.

BY DR. CHAS. H. MINER, WILKES-BARRE, PA.

READ OCTOBER 20, 1897.

It is now generally admitted, among those who have investigated the subject, that the specific protozoon parasite HÆMATOZOON MALARIÆ is the cause of the various forms of malarial fever. As the subject of malarial in all its phases is so vast, I will limit myself in this paper to a short description of the organism, the methods of examining the blood, and the report of a few cases to illustrate the advantages of such an examination. I hope the members of the Society in the discussion will give their views as to the etiology, pathology and treatment of the disease.

The discoverer of the malarial pigment is Heinrich Meckle, who found and described the pigment in 1848 in the blood and organs of the dead body of an insane patient. Planer, in 1854, was the first who saw the pigment in the fresh blood of living patients. Laveran, a French military surgeon, stationed at the time in the province of Constantin, Algeria, in November, 1880, discovered and described the parasitic nature of these and previously unrecognized forms in the blood of malarial patients, and thereby introduced a new era into our knowledge of malarial disease. He observed in the blood of malarial patients certain pigmented bodies different from melaniferous lencocytes, and discovered that some of these pig-

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mented bodies threw out long flagella, endowed with active lashing movements, as to convince him, as they have convinced every one who has since then seen them, that they are living parasites.

In 1885 Marchiafava and Celli, as the result of the examination of fresh malarial blood, came to a correct interpretation of these bodies and described them fully and accurately. Since these fundamental researches other observers have greatly extended our knowledge as to many details concerning the structure and life history of the parasite, although not a few important questions still remain unsettled. The most important of these later discoveries are due to the demonstrations of Golgi (1886) of a definite relation between the cycle of development of the parasite and the different stages of malarial fever, and the recognition of two varieties of the parasite belonging respectively to quartan and to tertian fever, and by Marchiafava and Celli of the variety belonging to æstivo-autumnal fever. These observations have led to two schools of doctrine —the one, headed by Laveran, holding to the unity of a pleomorphic malarial parasite; the other, headed by Golgi and other Italian writers, upholding the plurality of the parasite. Doch (1890-92) was the first to differentiate the three principal varieties of the malarial parasite in this country, and recently Thayer and Hewetson have published a thorough study of the malarial fevers of Baltimore, with careful descriptions of these varieties.

The malarial parasite is a unicellular organism, which develops within the red blood corpuscles of man, and belongs to the class of Protozoa, under which are grouped the organisms with the physiological characters of animals.

The cycle of development of the malarial parasite embraces a vegetative and a reproductive phase. Its duration varies from 24 to 72 hours, according to the variety of the parasite.

The vegetative phase begins in the form of small, colorless, amœboid hyaline bodies 1-24 in diameter, within the red blood corpuscle. These amœboid bodies increase in size and they develop within them a variable number of dark pigment granules, situated as a rule near the margin of the parasite. The

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pigment increases in amount and in the coarseness of the granules as the organism continues to develop. It occurs in the form of irregular grains, or of fine rods, which may be in active motion within the parasite. Having attained a certain stage of development the parasite gradually ceases its amœboid movements, assumes a spherical or oval shape, and becomes somewhat sharper in contour. In this condition it may continue to grow for awhile. When it has reached its full size it may completely fill the red blood corpuscle or may occupy only a part of it, these differences depending mainly on the variety of the parasite. It may now be called the full-grown or adult form. The subsequent stages in this cycle of development belong to the reproductive phase, which is shorter in duration that the vegetative.

The first evidence of this reproductive stage is the collection of the pigment into a mass of granules, or a solid block situated usually at or near the centre, but sometimes near the periphery of the organism. These bodies are designated by Thayer and Hewetson the presegmenting forms. Following the gathering of the pigment into a clump, the process of segmentation begins. In its most typical form segmentation is ushered in by the appearance of delicate lines radiating from the periphery toward the centre. Eventually the organism is divided into a variable number of round or oval bodies called spores. The enveloping red corpuscle, which now may be reduced to a narrow pale rim, bursts and the spores are set free, or the corpuscle may have disappeared before the process of segmentation is completed. The pigment remains behind and is quickly engulfed by phagocytes. The free spores invade fresh red blood corpuscles, where, as small, colorless, amœboid hyaline bodies already mentioned, they begin again the cycle of development. The direct transformation of the motionless round spores into the small hyaline amœboid bodies has been observed, though seldom, and there is no proof that there exists any stage intervening between these two forms. In the complete cycle of development which has been described we can distinguish, therefore, the following forms of parasites: (1) unpigmented, amœboid, hyaline bodies; (2) pigmented

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amœboid, hyaline bodies; (3) full grown or adult bodies; (4) presegmenting bodies; (5) segmenting or sporulation bodies, and (6) spores.

Golgi discovered that all of one generation of the parasite form a group, the members of which develop approximately at the same time, and that a definite relation exists between the phases of the development of the parasite and the stages of malarial fever. The onset of a chill or paroxysm corresponds to the ripening of one generation of the parasite. A few hours, or shortly before the paroxysm segmenting forms appear, and if one examines the blood at this time he can predict the approaching paroxysm.

Besides the forms which have already been described as representing phases of the regular cycle of development of the malarial parasite, there occur other forms which cannot at present be referred to any cycle of development. These forms are (1) crescentic bodies and fusiform round and oval bodies belonging to the same group, (2) flagellate bodies and free flagella, (3) degenerative forms.

(1). The *crescentric bodies* develop only in the irregular or æstivo-autumnal fevers. These bodies lie sometimes within the red blood corpuscles and sometimes free in the blood plasma. They are highly refractive bodies, somewhat larger than the red corpuscles, and are pigmented. It is still an open question whether or not they represent a stage in the life history of the organism met with in typical acute varities of malaria. Manson believes that the crescents are intended for the continuance of the life of the species in the external world and that the mosquito may serve as the host of this second cycle of development.

(2). Flagellate bodies, on the other hand, may form from each variety of the parasite. The weight of evidence is, that they do not exist in the circulating blood, but develop after the blood has been drawn from the body usually from within 10 to 20 minutes, sometimes earlier. They develop in tertian and quartan forms from the mature, full-grown extra corpuscular forms. The progress of development of the flagella may be studied under the microscope. The pigment granules us-

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ally begin to dance about in a lively way within the organism. Suddenly the flagella shoot out from the periphery and with their active lashing movements produce a violent commotion among the red blood corpuscles. The flagella vary in size, number and position. Their length may be three or four times the diameter of a red blood corpuscle. These flagellate bodies are the most startling of the malarial organism, and no one who sees them doubts for a moment that he is looking at a living parasite. There are a number of theories as to the significance of these forms, but the existing evidence seems to favor the hypothesis that they are phases of degeneration.

(3). There are various bodies, often seen in the examination of malarial blood, which are undoubtedly degenerative forms of the parasite. The more common forms are vacuolation, fragmentation, and deformities of shape.

In order to find out the intimate structure of the organism, staining has to be resorted to, and various observers have made the following summary: "The substance of the parasite consists of a more deeply staining outer part, which contains pigment granules, and an inner part which is pale and non-staining, excepting for a small body, which is usually situated at one side. This colorless area is generally interpreted as a bladder-like nucleus, and the dot on the side representing the chromatic substance or the nucleolus."

The malarial pigment is formed by the parasite out of the hæmoglobin of the blood corpuscles by what may be regarded as a process of digestion. The color of the pigment varies from a yellowish brown to black.

Relation of the organism to the various types of malarial fever.

As already stated, three varieties of the parasite have been differentiated by Golgi and many observers. On the other hand, Laveran and those who believe with him hold that the malarial parasite is a single organism, and that there is no relation between the forms in which it appears and the different types of fever. Laveran argues that all of the so-called varieties of the parasite may be explained simply as phases of a single organism influenced by various conditions of environ-

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ment, such as locality, season, individual predisposition and various unknown circumstances. He emphasises the view that malaria, with all its diverse manifestations, is nevertheless clinically and anatomically one disease, and has always been so regarded.

But Golgi and his party point out that the existing evidence goes to show that each of the three principal varieties of the parasite preserves its identity and is not transformed into another variety, that is to say, there is no evidence that a quartan parasite ever becomes changed into a tertian, or either of these into an æstivo autumnal parasite. Strong arguments in favor of this view are furnished by the experimental production of malaria. For it has been found, that if blood containing only one form of parasite be injected intravenously into a person unaffected with malaria, the variety of parasite injected, and only that variety, appears in the blood of the experimental case. If it is shown that under no existing circumstances one type is transformed into another, then we are justified in speaking of separate specifies of malarial parasites. We will follow the work of Thayer and Hewetson in describing the three species.

(1). The *tertian* parasite (which is the form usually found in the North Atlantic States) requires about forty-eight hours to accomplish its complete development, and is associated with, relatively, regular tartian paroxysms, lasting on an average between ten and twelve hours, associated almost always with the three classical stages—chill, fever and sweating. Frequently infection with two groups of tertian organisms gives rise to quotidian paroxysms; more rarely, infection by multiple groups of organisms gives rise to more irregular sub-continuous fevers.

(2). The *quartan* parasite is rarely found in this country, but is very common in Italy. It is an organism requiring about seventy-two hours for its development. It is associated with regular quartan paroxysms. Infection by two groups of the parasite causes a double quartan fever, with paroxysms on two succeeding days and an intermission on the third. Infection with three groups is associated with daily paroxysms.

(3). The more severe, often more or less irregular fevers,

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which occur in Southern United States and in Italy, more commonly in the later summer and fall, are the æstivo-autumnal fevers. This type of fever includes the remittent malarial fevers, as well as most of the cases of pernicious malaria and of malarial cachexial. The parasite of this fever passes through a cycle of development the exact length of which has not as yet been determined. It probably varies greatly, from twenty-four hours or under to forty-eight hours or more. But few stages of development of the parasite are found ordinarily in the peripheral circulation, the main seat of infection being apparently in the spleen, bone marrow, and other internal organs.

PHAGOCYTOSIS.

The colorless blood corpuscles act in malaria as in various other diseases as safeguards to the health of the body by destroying the parasite. The process is called phagocytosis and takes place in the blood vessels of the spleen and liver chiefly, but also in the general circulation. In examining malarial blood one often sees that the white corpuscles contain within their substance malarial germs in various stages of evolution, and also clumps and granules of pigment. There is also evidence that the blood plasma may exert a parasiticidal effect upon the malarial organism, when the parasite has escaped from the protective covering of the red blood corpuscle. The period when the largest number of malarial parasites are destroyed is that of sporulation and of free spores, and it is during this phase of the life history of the parasite that quinine acts most effectively.

LIFE OUTSIDE THE HUMAN BODY AND MODES OF INFECTION.

Our knowledge of the life of the organism outside the human body is practically negative, but Manson, in a series of papers read before the Royal College of Physicians of London, states a theory of the extracorporeal life of the parasite and the relation in which mosquitoes stand to malaria. He thinks that suctorial insects, such as the mosquito, taking blood from malarial subjects, the flagellate bodies develop in such blood within the stomach of the insect. The malarial organism may then, by means of the exuviae of the insect, be scattered over the coun-

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try, in stagnant pools especially, and as these infected pools are the breeding places of mosquitoes, it can be easily seen how the larvæ can in turn become infected. Man may become infected, he believes, by swallowing such polluted water containing the mosquito-bred hæmatozoa or by inhaling the hæmatozoa in dust from dried-up pools. He thinks that the organism upon entering man may develop into a flagellated spore and so penetrate the mucous surfaces and reach the human blood. That the hæmatozoa upon reaching the stomach of the mosquito do develop into flagellated bodies has been proven by Surgeon Major Ross, who undertook experiments in this line for Manson. Ross placed a native suffering from malarial cachexia and whose blood contained numerous crescents under a mosquito net, introduced mosquitoes which he had reared from the egg and collected the insects after they had filled themselves with the patient's blood. He then examined the blood in these mosquitoe's stomachs and found that all the crescents become spheres a few minutes after being taken into the stomach.

MODES OF INFECTION.

It must be admitted that we have no positive knowledge as to the mode of infection. But the most important ways of entrance into the system which have been suggested are—

(1). The respiratory tract.

(2). The digestive tract.

(3). The skin (insect bites, etc.).

1. It is a very general belief that infection may occur through inspiring air containing the malarial germ. Anderson noted numerous examples in which malaria occurred in houses which were exposed to wind passing over newly turned earth.

2. Many observers still believe that the parasite is introduced chiefly through the digestive tract. On the other hand, the negative evidence is very strong, as many investigations have proven that water from ponds and marshes in malarial localities may be swallowed without danger.

3. The inoculation experiments have given positive proof that infection may take place when the parasite is introduced

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beneath the skin, and with Manson's theory of infection through mosquitoes, it seems plausible that insect bites may sometimes serve to convey the contagion.

SIMILAR HÆMATOZOA IN LOWER ANIMALS.

Hæmatozoa occur both in cold and warm blooded animals, and in many instances closely resemble the malarial parasite, especially in birds is this so, and they are subject to a disease very much like malaria as it occurs in man. Last fall I found in blood taken from a horse that had a number of chills, an organism which seemed very similar to the organism of malarial fever as found in the blood of men.

THE DIAGNOSIS OF MALARIA AND THE METHODS OF EXAMINING THE BLOOD.

We have passed the time when any obscure fever, especially if it prove fatal, can be called malaria, for, as Osler has stated, "the diagnosis of malarial fevers can be made with certainty by blood examinations." We all know that a diagnosis of malaria, based upon clinical symptoms alone, has often proved false, that a tuberculous, a syphilitic, a typhoid, or a septic infection has been overlooked and termed malaria. The search for these bodies, it is true, may be very tedious at times, but it will be crowned with success if the disease in question be malaria. All that is needed by any one to make such an examination is a good microscope with an oil-immersion lens, knowledge of the technique involved and proper preliminary training.

The simplest and best method of studying the malarial parasite is in the fresh blood at the bedside or in the office. The steps toward the preparation of the specimen are quite simple, though certain precautions must be observed. As to the best time for examining the blood, almost all authorities agree that the organisms are best seen about the end of apyrexia and the beginning of the fever, when they are pigmented and large. They are, however, most numerous during the fever, but are so small that they are apt to be overlooked by the beginner. The cover-glasses and slides must be carefully washed immediately before use in alcohol and ether in order to remove all fatty substances. The blood can be taken from the patient's

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finger or the lobe of the ear, preferrably the latter, as the patient cannot so readily observe the proceeding, a point of considerable importance in nervous patients and in children.

The ear is first thoroughly cleaned; the lobe is then punctured with a lancet or a surgical needle. After the first several drops of blood have been wiped away the freshly cleaned cover-glass is taken in a pair of forceps and allowed to touch the tip of a small drop of blood. It is then placed immediately on a perfectly clean slide. If the slide and cover-glass be perfectly clean, the blood will immediately spread out between them, unless the drop of blood be too large, and the corpuscles may be seen lying side by side entirely unaltered. The drop of blood should be very small and the tip of the drop only should touch the cover-slip. A number of preparations should always be made, as one is sure to have frequent failures. Such specimens remain in good condition for about an hour.

In this manner we may see the parasite living and in active motion, while beautiful examples of phagocytosis may be seen.

STAINED PREPARATIONS.

To make slips for staining obtain the drop of blood as already described; lay upon it a cover-glass and allow the blood to spread, then separate the two slips by sliding them apart. If neither glass be lifted or tilted during this process, they will slide apart readily without sticking. The glasses thus prepared, are allowed to dry in the air, when they are ready for fixing and staining. To fix them for staining the glasses should be heated upon a copper bar for two hours, according to the method of Ehrlich, or they may be placed in absolute alcohol and ether, equal quantities, for two hours or more. The malarial parasite is readily stained by most of the basic nuclear dyes. A staining method which is as good as any in results, is that devised by Chenzinsky. A watery concentrated methylene-blue solution diluted one-half with water, is mixed with an equal volume of one-half per cent. solution of eosin in sixty per cent. alcohol. Place the slide in the staining solution and allow it to remain five minutes; then wash in water and mount in balsam. The red corpuscles are seen to

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be stained red with eosin, while the parasites are colored by the methylene blue.

In examining the blood in suspected cases of malaria we must remember that a negative result from one examination is not definite. Not infrequently is more than one microscopical search necessary for positive exclusion of malaria. In certain forms they may be indistinguishable in the first few days of the disease and in the irregular and chronic types they are sometimes found with great difficulty.

On the other hand, certain deformities of the red blood corpuscles are sometimes taken for plasmodia, *e. g.*, crenations, poikilocytes and vacuole formations. The vacuoles and clear spots may be distinguished in the fresh specimens by their sharp outlines and high lustre, and the absence of amœboid change of shape. Unstained spores may be confused with the blood-plagues, which are, however, structureless and contain no pigment. Occasionally small dots are seen in stained specimens of blood, especially in anæmic conditions, which must not be taken as parasites.

Blood examinations demonstrate not only the fact of malaria but also its types. My own experience has been that the only form of organism found in this valley is the tertian, and that usually the double tertian, with daily paroxysms. The tertian parasite is larger and more actively amœboid, with fine brownish actively dancing pigment granules, than the quartan, which has coarser, more slowly moving, darker granules. In the case of the tertian parasite the red corpuscles may be seen to become expanded and pale with the growth of the organism, while in the quartan parasite the corpuscle is shrunken and of a deeper, more brassy color. If the blood be examined just before the paroxysm the segmenting tertian organisms, with their numerous segments (20-30), may be distinguished from the smaller forms in quartan fever, with fewer segments (6-12).

When the æstivo-autumnal parasite is present it is associated with irregular or remittent fever. The parasite is small, very refractive, and the presence of the crescents distinguishes it from the quartan and tertian forms.

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DIAGNOSIS OF MALARIA.

In ordinary intermittent fever of recent origin there is hardly ever any question in the diagnosis. The regular paroxysms, with their three stages of chill, fever and sweating, are so characteristic as to leave little doubt in most instances concerning the nature of the process. Any doubt which may exist quinine usually clears up.

The value of the blood examination lies particularly in the chronic cases and in anomalous forms. Here one has to be constantly on guard, and it may be impossible for days to determine definitely the proper diagnosis. The presence of considerable anæmia, with a markedly enlarged spleen, which is always present in this form of fever, will lead us to suspect the true cause of the fever, which will be confirmed by the presence of the organisms in the blood.

W. W. Russell, in the Johns Hopkins Hospital Bulletin for November, 1896, reports four cases in which chills and fever followed operations in the Gynæcological Wards of the Hospital. Examinations of the blood were made and the hæmatozoa found in each case. Quinine in large doses stopped the chills and fever, and further surgical interference was not found necessary. I will quote his own words in the description of a fifth case: "A patient presented herself to a surgeon complaining of pain in the lower abdomen and pelvis, with chills and fever. Upon examination a mild pelvic peritonitis was found. She was advised to have the tubes and ovaries removed, and submitted to the operation. The patient had a severe chill the next day, followed by a rise of temperature to 107 and collapse. The blood was then examined and found teeming with malarial organisms. The patient eventually recovered, but nevertheless the operator was negligent in not excluding, by systematic study of the case, the possibility of malarial infection, before performing what proved to be an unnecessary mutilating operation."

During the past year I have examined the blood in over fifty cases of suspected malaria, and my results have in the main been quite satisfactory. From cases that occurred in the City Hospital I have selected four to report to you to-night.

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CASE 1.—The first case is one in which the chills had lasted for five months, as the patient had been treated for a disease of the liver.

History.—J. T., admitted to the City Hospital December 18, 1896, 42 years old, occupation blacksmith. Formerly lived near Pittston where the land was low and boggy and water lay stagnant and green the year around. His present attack commenced suddenty five months ago with a chill, fever and sweat. These he says continued daily for five months, up to and after the date of admission. On examination he was found to be somewhat emaciated and sallow. The mucus membranes, conjunctiva and skin had a yellow tinge. The spleen was enlarged and easily felt. There was a systalic murmur at the base of the heart. On examining the blood the day after admission large numbers of malarial parasites were found. The number of red blood corpuscles was reduced to 3,200,000 and the estimated hæmeglobin to 40%. Five grains of quinine in solution were given every four hours, and two days later he had his last chill. The anæmia and jaundice decreased slowly, but his general condition improved under iron and arsenic.

CASE 2.—D. G., admitted June 26, 1897, 23 years old, residence Georgetown. His attack began suddenly one week before admission with headache and a chill. He had a chill every day up to time of admission. The resident in charge at the time made a diagnosis of septic pneumonia, so quinine was not administered till the evening of the 29th. It was given in doses of five grains every four hours. The last chill was on the 30th. The blood examination showed tertian organisms. These two cases illustrate the immediate benefit from quinine.

CASE 3.—Mrs. F. V., Polish, age 24, admitted to the Hospital June 26, 1897. Has been in this country two years. Attack began three weeks before admission, and patient had a chill every day up to time of admission. The blood examination showed large numbers of tertian parasites. The temperature chart is interesting, as it shows the gradual effect of the quinine. The first four chills were about thirty hours apart, the fifth forty-two hours later, and the rest forty-eight hours apart, or typical tertian paroxysms. It is also interesting to note the very low temperature following the paroxysms, it being often below 96°. Quinine was first given in pill form, gr. V, three times a day, later gr. VI every three hours, and later still gr. XXX was given in divided doses, so as to be in the system to anticipate the expected paroxysm. The patient made a good recovery, but was deaf when she left the Hospital.

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CASE 4.—M. K., age 53, Italian, admitted to the Hospital August 2, 1897. The history given on admission was that the patient had been sick for four months with chills and fever. The physical examination found a blowing systolic murmur at the cardiac base and apex, but otherwise negative. The spleen was enlarged. The patient had an irregular fever, and at the end of the first week began to have chills, and since that time has had an irregular remittent fever with occasional chills. Four different blood examinations failed to show malarial organisms but there was a decided lucocytosis. After a thorough therapeutic test with quinine, a diagnosis of ulcerative endocarditis was made by Dr. Roe. The case certainly demonstrates the value of a blood examination in anomalous forms of fever. The autopsy confirmed the diagnosis of ulcerative endocarditis. The mitral valves were badly ulcerated and the spleen contained three abscesses.

In closing I wish to thank Drs. Lenahan and Howell for permission to report cases, and to express my admiration for the articles on Malaria by Prof. Welsh and Dr. Thayer in the American System of Medicine.

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DISCUSSION.

DR. S. P. MENGEL.—Dr. Miner has so thoroughly and systematically discussed this subject that there remains little or

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nothing new to be said on it. It is a subject, however, that has claimed the attention of distinguished scientists since the discovery of the Plasmodium by Laveran in 1880, and a vast amount of literature has accumulated devoted entirely to it. Thayer and Hewetson of Baltimore have alone written more than three hundred and fifty separate articles on it. Much has been written tending to make the searcher for the parasite believe it is difficult to find. This is not the case if it be searched for in the right way. It occurs in all cases of active malarial disease. Mansen says he has never failed to find it in such cases, and Mannaberg states that out of one hundred and thirty cases he has failed to find it in but three. Thayer and Hewitson say: "Excepting two or three instances, where the patients entered the hospital during convalescence, the specific microorganism was found in every case (616) of malarial fever treated in the wards."

TETANUS.

BY DR. E. A. SWEENEY, WILKES-BARRE, PA.

READ NOVEMBER 3, 1897.

In choosing this subject the object is to bring out the serum treatment.

We have to admit that the success in serum treatment of diphtheria has been beyond our expectations, and will probably constitute the treatment in future of a number of troublesome diseases which we now are unable to cope with successfully.

Tetanus is an infectious disease, generally traumatic in origin; characterized by a painful contraction of the muscles, beginning with those of the jaw or the neck and involving progressively the muscles of the trunk and limbs. It is accompanied by convulsive paroxysms and an irritation or inflammation of the nerve centers in the upper part of the cord, due to the presence of a bacterial poison in the blood and tissues.

ETIOLOGY: The bacillus tetani was first discovered by Nicolaier in 1884. It is a very slender rod with somewhat rounded ends, in shape of a drum-stick, or pin shape. First obtained in pure culture by Kitasato in 1889.

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The bacilli remain at the seat of infection and do not spread through the body and the disease is therefore a true toxemia.

Hennjeau, by means of a splinter of wood that caused tetanus, was able after eleven years to again cause tetanus by inoculating an animal with portion of the same splinter.

The bacilli are found in the superficial soil in temperate (and particularly in tropical) regions, in the mud of streets, garden soil and crumbling masonry.

The etiology has received a vast amount of study. Verneuil, a French writer, regarded persons brought in contact with horses particularly susceptible.

Considering the great amount of bacilli tetani that are constantly to be found about us, it seems surprising that tetanus is so rare. This is explained by the anaërobic nature of the bacilli. The presence of free oxygen prevents development of bacteria. The bacilli are therefore unable to find an opportunity to grow upon small, superficial wounds, except in rare instances.

Punctured wounds lodge the organism deep in the tissue. In a wound caused by a splinter, nail, tine of a pitchfork, should it carry with it soil, manure, or dirt from the skin, the conditions are more favorable for the inoculation and development of the bacilli.

Predisposing causes may be mentioned. 1. *Age:* Yendell has shown that it is peculiarly fatal to persons under ten years of age; and that this period included seven per cent. of all cases collected by him. One case was reported by him in a man eighty-nine years of age.

2. *Traumitism of all kinds*, with or without wounds, may be complicated with tetanus. Tetanus has been seen to occur after subcutaneous injections of quinine, or after dilatation of the neck of uterus by sponge tent. One of the most important factors in etiology of tetanus is individual predisposition; also moist cold, sudden variations in temperature, exhaustion and exposure have quite a bearing on this disease.

Tetanus is divided into acute and chronic. Acute tetanus appears during the first week of the period of the healing of

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the wound; chronic tetanus, with a period of incubation, in the second or third week.

Labonne relates a curious fact, that in some of the Hebrides Islands tetanus neonatorum is endemic to a remarkable degree. In St. Kilda the total number of children of fourteen couples who were living on the island in 1880 had been 125; of this number eighty-four had died during the first fourteen days of life of trismus. The inhabitants of the island subsist chiefly on oil and the flesh of sea-birds, burning the guano for fuel. There are no horses on the island.

Fisher, Duckek, Gierds, Summoneau and Riborellus report cases of typhoid fever complicated with tetanus.

Brownlee reports tetanus following abortion in the fourth month. Patient did well until the seventh day, when trismus set in, and she died in a convulsion fifty-four hours after the onset of the disease.

Chapin reports a fatal case of trismus which began in an infant six days after birth, death ensuing on the ninth; due to infection of the umbilical cord.

Phillips reports sixty-four cases of tetanus complicating ovariotomy, and explains that the operation of ovariotomy has elements productive of tetanus, in nerve irritation, tearing of adhesions and ligation of pedicle.

Doran, in return, says, that out of 1300 cases of ovariotomy which he attended, he only saw two eases of tetanus, and they were exposed to draughts, the weather being changeable at the time.

Camuset reports a case of tetanus in an epileptic. The case was one of idiopathic epilepsy. Tetanus developed after a burn on the hand; it first affecting the jaw, then later becoming more general.

Dr. Boyle, in the *Medical and Surgical Reporter*, reports a case of idiopathic tetanus. Patient beginning with pains in the stomach; later developed trismus and opisthotonus. This woman had become greatly alarmed at seeing the hand of a child placed on a machine in motion for cutting turnips, although with no injury to the child further than a slight scratch. It was a case of idiopathic tetanus from nervous shock.

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Variations of Temperature in Tetanus: Wunderlich found a temperature of 112.5 F., shortly before death; rising to 113.7 F. after death.

PATHOLOGY: Most frequent lesions are those of the spinal cord. Inflammation of the cord and membrane is often found, and occasionally an ascending neuritis.

Symptoms: Tetanus reveals itself by two orders of symptoms; one, constant and necessary, muscular contraction; the other, variable or absent, elevation of temperature. The first symptom usually noticed is that of feeling cold and a stiffness of the neck. Later there is a stiffness of the muscles of the jaw which make it difficult to open the mouth. This muscular rigidity is followed by muscular contractions which become so painful and continuous that the jaw cannot be opened. Patient is unable to swallow even liquids. Masseters are found in rigid contraction. The muscles of the back and neck are later affected, causing opisthotonus. The arms are only partly affected. The muscles of the face, after the second day, are contracted and give the face the "*risus sardonicus.*" The attitude is characteristic; the patient lies on his side, and is motionless, with the head drawn backward. Diaphoresis is marked. Sleep is impossible on account of contractions.

In chronic tetanus the period of incubation is longer, the first symptom appearing on the second or third week of the injury. Wounds of the extremities seem to cause tetanus more often than those of any other part of the body; partly explained by the fact that punctured wounds are found there more often than in any other region. Of 505 cases reported in the *Medical and Surgical History of the Rebellion* seventy-six were wounds of the extremities.

In military practice tetanus is of common occurrence. In the Peninsular War it occurred in about one case in every 200 wounded. In the Schleswig-Holstein War of 1849, one to every 500 wounded. In the Crimean War it was scarce. After naval engagements, the mortality is high if in tropical regions. In the West Indies, of 810 injured, forty developed tetanus. All army surgeons agree that sudden changes from heat to cold is the most frequent cause of tetanus in the wounded.

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Larrey states that after the battle of Moskowa, although the number of wounded was immense, there were few cases of tetanus, the heat being great and continuous; while after the battles of Dresden and Bantzen, when great heat was followed by wet and cold, the wounded suffered severely from tetanus. Heunen states that a draught of air, either hot or cold, directly blowing on a patient, is the most fertile cause of tetanus.

Diagnosis is usually not difficult in the developed stage of the disease. Stiffness of the jaws may be due to inflammatory affections of the mouth or teeth or to abscess of the cervical glands. Rheumatism of the tempero-maxillary articulation may prevent the patient from opening his mouth. Hysterical contractions of the masseter muscles may be mistaken for it.

Strychnine poisoning resembles tetanus, but there is usually no lock-jaw; and if the masseters are affected they are the last muscles that are contracted. In strychnine poisoning there is hyperæsthesia of the retina, objects are colored green.

Tetany, a disease not often seen in America, affects young persons chiefly. It consists of tonic spasms of various groups of muscles, often those of the upper extremity. Opisthotonos may occur, but never trismus.

PROGNOSIS: If the patient survives to the fourteenth day, prognosis is good. Gravity of the prognosis usually depends upon the violence and severity of the convulsions.

The death rate of those cases in which the tonic spasms occurred within two weeks after the injury, is 62%; from the fourteenth to the twenty-first day, 17%; from twenty-first to the forty-fourth day, 17%. 50% of all fatal cases terminated within five days from the first paroxysm; 33% from the fifth to the tenth day.

Treatment: Chloroform is of the utmost importance. It is used by inhalation, either to the point of anæsthesia, or a napkin may be placed on the chest, keeping the patient thus exposed to the influence of the drug. Chloral is best in chronic tetanus. Opium may be used in large doses to control spasm, but the digestive disturbances contraindicate the drug. Calabar bean given in small doses relieves the muscular contraction. Large doses increase the spasms.

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Byrd of Quincy, Illinois, reports three cases of tetanus cured by large doses of Fowler's solution. He gave from 20 drops to ½ a teaspoonful, three times a day, with no symptoms of arsenical poisoning.

Dr. Renzi cured three out of four cases by absolute rest. Patient's ears are filled with cotton wool. He is then put in a dark room away from any noise; a thick carpet covers the floor. He is visited every four hours by the physician. Food and liquid poured into his mouth. Constipation is disregarded. Ergot and belladonna are used to abate pain.

But the best results have been obtained by the antitoxin treatment. Hewlett reports fifty cases treated by antitoxin, with a mortality of 31%; mortality under old treatment is 90%.

The serum is obtained from the blood taken from horses which have been injected repeatedly for over two years with large doses of pure cultures of tetanus, the toxin of which caused the death of a full grown guinea pig within a few days, when a dose of $\frac{1}{100}$ of a drop is injected hyperdermically. Its immunizing power is equal to several millions its own weight.

It is a well known fact that the sooner the treatment is begun the more successful it will be. 25 or 50 c. c. of serum may be sufficient to cure an incipient case, but 125 to 150 c. c. may be required if the patient has been submitted for a day or two to the deadly influence of the Nicolaier bacillus. The injections should be given hyperdermically, preferably in the lateral part of the abdomen, after the site of the injection has been carefully disinfected with a four per cent. solution of carbolic acid or a one per cent. solution of Lysol. Improvement in the general condition of the patient may not follow the injection of the first dose, as the preventive action of the antitoxin is far greater than its curative power; in fact its effect bears more on the tetanus toxin which is still to be absorbed than on that which has already been carried into the system; hence 25 c. c. should be injected at once and 25 c. c. administered every six hours until improvement takes place; then the injections may be discontinued, to be resumed later if the condition of the patient is not steadily becoming better. In using the syringe only one puncture should be made, repeated punctures

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being liable to cause convulsions. The patient should be placed in a dark room. The treatment of tetanus with antitoxin should not exclude symptomatic medication. In severe cases washing of the blood has been resorted to and satisfactory results obtained thereby. To do this, about 200 c. c. of blood may be drawn and one quart of artificial serum injected into the veins of the patient. No local reaction should follow the injection of antitoxin, but in some cases slight arthritis, erythema or urticaria may be observed. These slight inconveniences will disappear in a few days. The action of tetanus being very deleterious on the heart, it is important to watch the function of that organ when the patient begins to improve.

Dr. Lambert, in *New York Medical Journal*, found 31 acute cases developing within eight days of time of infection in which antitoxin was used, mortality of 61⅓%. In cases of longer incubation and slow onset of symptoms, mortality 5% in 40 cases.

Of puerperal tetanus only 119 cases have been reported. Of this number five are reported in the *University Medical Magazine*, and three of the five cases were in the maternity hospital.

CASE 1.—C. I., aged 23, colored, was admitted to the hospital in labor February 6, 1896, and was delivered next day. Labor normal. She convalesced rapidly up to February 12th, when she first complained of a stiff neck; on the 14th she refused food and medication, saying that she could not swallow or open her jaws. Her head was drawn back and jaws firmly locked. She died on February 15th, three days after the first symptom. Bacteriological report: Inoculation of a guinea pig with patient's blood produced no effect. Inoculation of guinea pigs with the bloody mucus in uterus and cervix produced tetanic convulsions, the animal dying in twenty-four hours.

CASE 2.—Age 18, white, admitted to hospital March 23, 1896. March 24 labor was induced by the insertion of bougies, as patient gave a history of being overdue. Delivered the following day; easy labor. April 1st, seven days post partum, she broke into a violent tetanic convulsion and died the next afternoon. Temperature rose from 99.4 to 109.8 before death; after death to 111°. Bacteriological report was negative.

CASE 3.—Aged 20, colored, entered hospital on January 7,

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1896. On March 30 labor was induced by the insertion of bougies, and she was delivered on March 31, after an easy labor. She convalesced well until April 2, when temperature rose to 103, caused by constipation. This yielded to treatment, and convalescence progressed rapidly until April 12, when she complained of a stiff neck. The same day convulsions made their appearance. She died on the 15th. Inoculation from this case was negative.

CASE 4.—Mrs. R. aborted as the result of a fall from a car January 10, 1896. The membranes were cleaned out and came away complete. Three weeks after abortion she had a slight chill, temperature 102.6, and slight stiffness of the neck; next day slight trismus. In the evening the symptoms were more marked. Treatment controlled the spasms a great deal, but two days later she died suddenly.

CASE 5.—Mrs. A. had a severe fall a few days before term. A few days later she gave birth to a child. Labor normal except an adherent placenta, which was removed by physician in attendance, after sterilizing hand, and some thirty-six hours after condition good; the temperature gradually rose, and the third day dysphagia appeared; later trismus; next day spinal arching and total inability to swallow. Death on sixth day.

Investigation of these cases, three of them in the maternity hospital, was instituted. It was discovered that the head nurse had been in the habit of making the bichloride sol. with distilled water, while the creolin douches were made with water drawn directly from the faucet. The color of the creolin solution disguised the filthy condition of the water. Owing to a misunderstanding, the resident, during his term of service, had been in the habit of administering to all women confined in the maternity an intrauterine douche of a 2% sol. of creolin instead of a vaginal one. Every one who has seen the condition of the Schuylkill river during the spring freshets can well appreciate the amount of infectious material this polluted water would carry to an abraded surface.

There are only two other sources from which the infection could spring—one, the furnaces, which, being worn out, were blowing an unusual quantity of dust into the wards; the other, the bougies used for the induction of labor in cases 2 and 3, which may have been insufficiently sterilized. As the first

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woman entered the hospital in labor, there is a possibility she was infected previous to her entrance.

I have had an opportunity of seeing three cases.

CASE 1.—J. R., stable boss, age 40, had his large toe crushed by being stepped upon by a mule. The wound was dressed antiseptically, but on examining the wound four days afterwards, there was considerable pus, and it was necessary to amputate the toe. Two days afterwards he complained of cold and pains over the body. Next day he felt muscles of the back getting stiff; then the jaw, and gradually those of the back, chest and legs. He was treated with calabar bean, chloroform and diaphoretics, but died on the eighth day.

CASE 2.—William M., age 14, was shot on the index finger with a No. 22 cartridge by a playmate. Wound was dressed antiseptically. About the fourth day he complained of stiffness about the jaw, and the next day the jaw was firmly set and the muscles of neck and back were beginning to be affected. He had the *risus sardonicus* and opisthotonos. He was treated with chloroform inhalations, large doses of chloral and potass. bromide by the rectum; calabar bean was used in small doses. The patient made a good recovery.

CASE 3 was here in the city. Butcher, aged 40. He was trying to catch a calf that was running loose, and caught it by the tail. The calf jumped and almost amputated the top of the little finger. The case was treated by Dr. Murphy, and I helped him amputate. Two days afterward the hand was swollen to twice its normal size; wound was angry and inflamed. The stitches were removed from the end of the stump and several incisions made in the finger and back of hand. The hand was poulticed with flaxseed and charcoal. The next day his jaw felt stiff, and that night the other muscles were affected. He died on the seventh or eighth day. Treatment was chloral and potass. bromide for spasms; morph. for pain.

DISCUSSION.

DR. CHAS. LONG.—Although I have seen a number of septic cases from wounds, my experience with tetanus is very limited. The essayist has covered the ground effectively. It would seem to me to be a disease of the nervous system entirely, and probably caused by injury of the nerve or nerve ends primarily. The infection undoubtedly comes from without the body, and the fact that tetanus is more common after

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gunshot and punctured wounds which have probably not been thoroughly cleansed would tend to prove this point. Tetanus is not as common a disease now as formerly, which is no doubt due to the antiseptic and aseptic treatment of wounds.

We now know that the disease is caused by a special bacillus. Whatever the cause, however, the action is to bring about an augmented excitability of the nervous centres located in the spinal cord, the first indications of which are observed in the domain of the fifth pair of nerves, and therefore the first part to be affected is that portion near the exit of these nerves or their immediate vicinity. Death is due to one of three causes, asphyxia, exhaustion or hyperpyrexia.

I do not believe in idiopathic tetanus. The cases which the essayist describes as such, and in which the pain and train of symptoms commenced in the stomach, were probably due to ulcer or some other lesion of the stomach, and a post mortem would have proved this.

Since the discovery of tetanus antitoxin the mortality is much reduced, but this antitoxin has proven more of an immunizing agent than a curative one; so it must not be depended upon alone but the older remedies, chloral, chloroform, etc., should be used as adjuncts. Under this head, I should like to call the attention of the Society to the Buisson treatment, that of hot vapor baths, which have been so successfully used in hydrophobia, and which ought to be beneficial in all infectious diseases, as it rids the body of the poison by a process of elimination. The patient is placed in a vapor bath, the temperature of which is suddenly raised to 135° F., and then gradually to 145° F. It would of course be more convenient if such treatment could be given in a well regulated Turkish bath, but the absence of such an establishment need not deter one from attempting it, as vapor baths can easily be arranged at the patient's home.

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ACUTE DISEASES OF THE HEART.

BY DR. JOHN HARRIS JONES, WILKES-BARRE, PA.

READ NOVEMBER 17, 1897.

Acute diseases of the heart are in the main of the inflammatory type, but their onset differs very materially from inflammatory affections of other viscera. Myoyo and endocarditis are the most prevalent forms. These inflammations, I repeat, differ in many respects from inflammations elsewhere. I shall endeavor to point out, very cursorily, a few of these peculiarities.

First. Endocarditis is never idiopathic. It invariably arises from some other pre or co-existing disease, usually one with a specific dyscrasia. (I purposely exclude that form which arises from trauma.) The poison of rheumatic fever is the chief cause, but others, such as occur in Bright's disease and pyæmia, especially the post-partum kind, are quite frequent causes; and of the exanthemata, erysipelas and scarlet fever are by no means insignificant factors in its production.

The connection of endocarditis with that nondescript disease, known as chorea, is an exception to the foregoing rule, if we disregard or dispute the latter's rheumatic origin or relationship. We do not understand the modus operandi of the action of these poisons, wherewith an inflammation of this particular structure is produced, neither can we account for their whole energy being expended upon the left heart. The generally-accepted theory is that force and tension, rather than any peculiarity in the blood or in the membrane affected, are the chief causes in producing endocarditis; and for the same reason it is claimed that when endocarditis occurs in the fœtus *in utero* it is almost always right-sided. Still it seems to me, judging from the proneness of this disease to occur in connection with diseases known to have an altered blood constituency, that the nature of the fluid itself traversing over this membrane has something to do in the causation. Can it be that the oxidation which the blood undergoes in the lungs or the placenta gives a certain nasceney to the poison which is so soon to be carried by the circulation and expended on this

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part of the heart? Another peculiarity of endocardial inflammation is that the attacked tissue is probably never restored to normal again. Its after-effects increase in importance and significance as the years roll by, placing prognosis, when compared with inflammations elsewhere, in a very hazy atmosphere indeed. A more favorable prognosis can be given to an endocarditis arising from scarlet fever than to one of a rheumatic origin; for one attack of the former gives the subject almost certain immunity against another, whereas the latter is very apt to repeat itself. Among other characteristics of this form of acute heart disease, mention may be made of its rare fatality whilst in this stage. Nor is its advent heralded as are other visceral inflammations by high fever, vomiting, or pain; rather does it elect to come quietly—almost stealthily—and unless the medical attendant be very much on the alert he may awaken some morning to find that this much-dreaded enemy has quietly ushered itself in, being usually found ensconced among the curtained drapery of that most sacred chamber in the "fountain of life"—the left ventricle—where it has already accomplished injuries that will take more than a lifetime to repair. The significance of the absence of real pain in this lesion should never be lost sight of. The patient may complain of a little discomfort or oppression over the cardiac region but never actual pain. There may, however, be some elevation of temperature beyond that induced by the co-existing disease; hence it is a much better rule to examine the heart at every visit than to trust to the promptings of symptoms.

To that malignant form known as ulcerative endocarditis my previous remarks are not to be accepted as being strictly applicable. That affection is probably not nearly so rare in its occurrence as perhaps some of us are inclined to believe. It generally occurs in acute rheumatic fever, pyæmia, pneumonia, the septic fevers, and in septic conditions. This inflammation is very intense. The necrosis produced by it is oftentimes quite extensive. The vegetations seen on the valves are green, grey, or yellowish green; and these colors, whenever or wherever seen, are always indicative of a very malignant inflamma-

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tion. The vegetations are studded with micro-organisms—streptococci and staphylococci. The pneumococcus has been detected in them; in these cases the patients have also suffered from pneumonia. Emboli arising from them have all the characteristics of their parental origin They are oftenest seen in the spleen and kidneys, and not infrequently in the membranes of the brain, where they set up an acute suppurative meningitis which is very fatal.

The treatment of ordinary endocarditis resolves itself into the treatment of the co-existing disease. The salicylates are undoubtedly of great utility in all forms of the disease independently of their origin.

Heat or cold applied over the heart's region is soothing, and subdues the inflammatory process. The importance of prolonged rest in the recumbent position should be insisted upon for weeks or even months. Under its persistent enforcement it is astonishing what a soothing and mellowing influence it exerts over some of the coarsest and roughest of heart murmurings.

Cases have recently been recorded of recovery from the ulcerative form by the use of antistreptococci serum. As a prophylaxis against all of these lesions I would confide chiefly in the internal administration of the salicylate of soda.

There is one other acute affection of the heart about which I should like to make a few remarks. I refer to heart strain. In this age of rush, boat-racing, mountain-climbing and century runs, the heart is taxed very heavily, sometimes nigh to breaking.

I have seen three or four cases of acute heart dilatation (for this is the pathological condition found in heart strain) brought about in coal miners who have been engaged in laborious work in ill-ventilated and dusty mines.

The symptoms usually noted were increase of heart area, shortness of breath, and a tendency to syncope. In addition to these a bruit or murmur was generally present, which could be heard loudest at the apex and accompanying or replacing the first sound of the heart.

The treatment of this condition consists in keeping the pa-

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tient in bed, allowing him a generous dietary and the internal administration of strychnia. Many of the cases recover in a week or two, the heart muscle regains its normal tonicity and the murmur disappears. In others the cardiac muscle remains permanently damaged, unfitting its possessor for any further active service.

THE ACUTE DISEASES OF THE HEART.

BY DR. W. H. FAULDS, LUZERNE, PA.

READ NOVEMBER 17, 1897.

Ever since the discovery of the circulation of the blood by Harvey, abnormal conditions of the heart have had a prominent place in the writings of medical authors.

As physical diagnosis came into prominence, the heart-sounds and pulse-wave were so closely studied as to leave but little to be added by recent text-book writers upon this topic.

The older practitioners, who entered the profession three or four decades ago, often now refer with pride to the indications afforded by the pulse, when examined by one whose *tactus eruditus* gave him special knowledge of this central organ of the circulation, at a time when diagnosis and prognosis depended upon the relation of the heart impulse to other abnormal conditions—the latter often being an unknown quantity. * * But since the days of the clinical thermometer, sphygmograph, stethoscope, and microscope in the hands of skilled bacteriologists, the old doctor with his dignified bearing, and sometimes assumed superiority, has lost prestige in his chosen profession, will soon be gone from us, though not forgotten, and will be known only in fiction to the on-coming generation. Heaven bless the old practitioner of medicine! He has stamped his impress upon the world; those of us who know him best love him most, not for his superior knowledge, but for the practical and intelligent application of the learning he possesses; and because his teachings, though sometimes ridiculed, paved the way for grander achievements in medicine

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than he or the world ever dreamed of. All accomplished, too, within a quarter of a century. But, notwithstanding all that has been written on heart affections, the researches of modern biologists and bacteriologists regarding the etiology of acute diseases have invested them with an interest that will undoubtedly stimulate still further observation and study.

From the standpoint of the clinician we may never know any more about acute endocarditis and myocarditis than we do now. The post mortem appearances in those who have died of these affections may never be better understood than they are at the present time. The deductions of the bacteriologist and biologist in the cases may never be more accurate than they are to-day. In the fatal cases of acute heart disease, associated with diphtheria, scarlet fever, rheumatism, pneumonia and septicæmia, the bacteriologist will undoubtedly continue to find on the valves of the heart the microbe peculiar to each of these diseases. The biologist may perhaps never be able to give a more minute and correct description of the heart-structure as the result of endocarditis or myocarditis, but it does seem that we are on the eve of a change in the treatment of these affections, as they occur in the acute fevers, that will give us better results than we have heretofore attained.

Already the serum treatment of diphtheria has undoubtedly saved thousands that would have died of these dreaded complications of that formerly fatal malady. Investigations along this line indicate that scarlet fever antitoxin may be the next to move to the front with this class of new remedies. The pneumococcus of pneumonia, the staphyloccus and streptococcus of septicæmia, the bacillus of phthisis and typhoid fever, and, in fact, every other pathogenic bacterium, will in all probability soon be made to feel the power of advanced therapeutics in those diseases which destroy life by feeding upon the tissues of this most vital of all the organs of the human economy.

A question which naturally arises here is, do the acute diseases of the heart ever occur except as complications of other diseases? Osler says: "The existence of a primary endocarditis has been doubted," but goes on to say that there have been cases of persons, in previously good health, who have

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been taken with all the symptoms of typhus or typhoid in which post mortem appearances showed no other lesions except malignant endocarditis. But on the other hand any one suffering from the presence of a specific poison in the blood may become the subject of these secondary heart lesions.

A simple acute primary inflammatory affection of the endocardium is described by some authors. Again, some writers contend that all cases of acute endocarditis are of bacterial origin. It does seem to me that in all cases there must be a condition of lowered vitality before the bacteria can become active. In other words, we believe it is still an open question whether the bacteria are the cause of the endocarditis or are present because de-nutrition of the heart muscles has furnished them with a favorable soil in which to propagate and become virulent. This is in accord with the theory that bacteria find suitable pabulum only in tissues of lowered vitality, or in the incipient processes of degeneration and decay; and that it would be just as unnatural for bacteria to live, propagate, and excrete this poisonous product upon perfectly healthy tissue as it would be for the human family to subsist and thrive on stinking meat. In other words, decomposing or partially devitalized animal tissue is the natural food for the microbe, while healthy animal tissue must be the nutritive element of those who would maintain a healthy and vigorous human body.

This is a principle that should always be kept in mind in the treatment of acute infectious heart diseases. And when we have found a serum that will neutralize the poison of pneumonia, scarlet fever, and other infectious diseases, as we now do the poison of diphtheria by antitoxin, the treatment of these affections will have been solved; until then we shall continue to use the means experience has taught us are the best.

A few years ago we were taught that reduction of temperature was the great desideratum in the treatment of all diseases characterized by high temperature, and that unless this could be accomplished death from heart failure would be accelerated. In opposition to this teaching, recent medical writers maintain that high temperature is not only not harmful but may do

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good. That it will at certain times "reëstablish equilibrium in exhausting nutrition by bringing about interstitial metamorphosis." This, says one writer, is evident in gout and he believes it to be true also in infectious diseases. Pasteur has shown that certain microbes cannot live beyond certain temperatures which do not kill a human being, that the bacteria of malignant pustule cannot live in a temperature higher than 104°. Fowls are said to be immune from this disease because their normal temperature is above that point. The same author says nutrition is not affected by high temperature, there being no decrease in weight during fever, not even in typhoid fever cases; the decrease in weight occurring during convalescence. Neither does high temperature produce exhaustion of the heart, either through functional disturbances or excess of work, and "the functional incapability through excess of work is a myth."

Dr. Carpenter of the New York Academy of Medicine, in a discussion on antipyretics, said that with regard to heart failure and degeneration of the muscular forces of the heart from high temperature, he had had opportunity to examine microscopically the cardiac muscle in a sufficient number of cases to make it quite certain that it "did not occur with the frequency that one might be led to expect from the readings of the German observers." Dr. Loomis said on the same occasion that heart failure in high temperature was "due to failure in nervous supply as much as to muscular changes."

However much of truth or error there may be in these statements, no fact is receiving more every-day confirmation than that the reduction of bodily temperature by cold offers the best results in all diseases characterized by high temperature. In pneumonia the beneficial effects of treatment by cold applications to the chest is being recognized. It certainly calms the nervous system, strengthens the heart contractions and improves the general condition of the patient. The improvement being so marked, in this respect, as to seldom fail to call forth favorable comments even from the ordinary observer.

Just how the application of cold is productive of these results, Baruch endeavors to explain in his work on "The Uses of

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Water in Modern Medicine," and from which I quote. He says: "Since it may now be regarded as an established fact that high temperature, minus infection, does not produce those serious degenerations formerly ascribed to it, we must seek in the infective process, and the ptomain intoxication resulting from it, the deleterious effects upon the vital organs which undermine the system and cause death."

"The cold bath treatment," says this author, "yields the most triumphant results in combating these very effects of the infective and toxic agencies, with whose true entity we have not yet been brought face to face. It has been clearly demonstrated by numerous trustworthy observers that the reflex stimulus aroused by the shock to the extensive peripheral nerve-endings so energizes the nerve centres which furnish innervation for circulation, respiration, digestion, tissue formation, and excretion, that the system is enabled to tide over the dangers which would ensue from failure of these functions. This is in a nutshell the effect of cold bathing; the simple cooling effect on the blood occupies a secondary, though not important office."

Then as the outcome of our researches, we arrive at the conclusion that while, in most instances, death from the acute heart affections is due to the poisons produced by bacterial activity, we are also assured that in our efforts to overcome their effects upon the system, and particularly upon the heart, we have in the application of cold a remedy, not only free from danger, but in the results attained, superior to all others.

DR. J. T. HOWELL REPORTED A CASE OF ULCERATIVE ENDOCARDITIS, AND EXHIBITED PATHOLOGICAL SPECIMEN OF THE SAME.

Marian Koss, aged 53 years; an Italian by birth; a trench digger by occupation; admitted to the hospital August 28, 1897. As neither he nor his friends could speak English nothing could be learned about his family or personal history, and all that could be gathered as to his previous condition was, that for about one month he had been suffering from chills, fever, and sweats, associated with great prostration. On admission he was in a markedly depressed condition, walking with difficulty on account of weakness. His skin was sallow.

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There was loss of flesh, coated tongue, anorexia and constipation. Pulse, 96; temp. 99.4; resp. 24. Repeated physical examination of the thorax and abdomen failed to discover anything abnormal except a mitral systolic murmur, a moderately enlarged spleen and slight tenderness over the liver.

Microscopic examination of the blood for malarial organisms, both fresh and stained specimens, proved negative, and the Widal test for typhoid gave no reaction. Urinary analysis showed only an increase in the phosphates. The absence of the malarial organism and the failure of anti-malarial remedies excluded the malarial infection. The use of anti-rheumatic drugs was followed with no success. The presence of typhoid fever was rendered improbable by the character of the temperature curve, the absence of rose spots and the Widal reaction, and the presence of rigors and sweats.

The diagnosis was based on the evident presence of a progressive valvular lesion and the symptoms of sepsis. No exciting cause could be discovered and some of the most characteristic symptoms, *e. g.*, those due to embolism, were not present till late in the course of the disease; but the weight of evidence pointed to ulcerative endocarditis as the only rational explanation. The whole illness, while in the hospital, extended over a period of two months and ten days. The pulse at first of good quality, and ranging from 60 to 90 beats per minute, gradually became weaker and more rapid, running from 90 to 112 in the latter part. The temperature curve was the most striking feature of the case, on account of its extreme irregularity. The daily variation amounting at times to 5° and 6°. While the general elevation would average in the neighborhood of 101°, there would be periods, extending in some instances to 48 hours, in which it would not rise to 99°, and others in which it would not be below 100.4°; these occurring irregularly through the whole course of the disease. The evening elevations were generally high, frequently reaching 104°, and the morning remissions marked, often falling to 97° and below.

The treatment, as already stated, was at first directed against the possible malarial and rheumatic causes of the trouble; but later an effort was made to combat the septic process. Stimulants and tonics were administered with little effect. Antistreptococcic serum was used with no appreciable influence on the course of the disease, and later nuclein was given hypodermically with the same result. The autopsy showed the posterior leaflet of the central valve almost completely destroyed, and the ventricular wall behind eroded and covered

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with vegetations. A nodule was also present in one of the aortic cusps. The lungs were somewhat congested. The kidneys somewhat enlarged and soft. The spleen was increased in size, soft, and its capsule very friable. About one-half of its pulp was completely broken down and the remaining portion filled with areas of infarction. A plastic peritonitis was present, due very likely to rupture of the degenerated spleen into the abdominal cavity, and was without doubt the immediate cause of death.

SYPHILIS.

BY DR. RICHARD P. TAYLOR, WILKES-BARRE, PA.

READ DECEMBER 1, 1897.

As syphilis and its sequelæ, also the different forms of treatment, occupy such a wide field in medicine and surgery, it will be impossible for me to-night to bring out all the different characteristics and the various modes of treatment, but I will confine myself to a few of the most important characteristics and treatment of the disease.

The Syphilis Bacillus.—There is some doubt as to whether the micro-organism which causes this form of the granulomata has been found or not. The micro-organism presenting the first claim is that discovered by Lustgarten, which is a bacillus from three to four microns long and eight-tenths microns wide. It resembles somewhat the bacillus of tuberculosis in the fact that it often presents its borders shrunken and shrivelled; the extremities are at times slightly bulbous; each bacilli may present from two to four spores. The bacillus are generally found in the cells rather than in the intercellular spaces, and are most abundant in cells surrounding the cellular infiltration characteristic of syphilis, and they may be found also in the perfectly healthy tissue beyond.

Demonstration.—The preparation is placed for a few minutes (if a cover glass preparation), or for a few hours if a tissue section, in a watery solution of fuchsin (as usual, the method may be hastened by heat). Wash in water containing a few

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drops of sol. chloride of iron in an ounce of water. The preparation is then immersed in pure sol. of ferric chloride until it assumes a violet hue. It is then passed through several changes of alcohol and mounted. The bacillus is stained red, the other tissues blue. A bacillus resembling the above is found normally in smegma, but if the same method of staining be used, the smegma bacillus will be found more resistant to the acid than the syphilis bacillus; the syphilus bacillus looses its color in about forty seconds in the acid, the smegma bacillus resisting for about two minutes. The smegma bacillus is also more easily decolorized by alcohol.

Syphilis manifests itself by a tolerably regular course, and its lesions are of two distinct types—inflammatory and specific. The first manifestation of syphilis is the hard chancre; this occurs two or three weeks after inoculation. This hard chancre is usually found in the corona of the glans penis, and is an induration, cartilaginous to the touch, and about the size of a split pea. The induration is somewhat difficult to account for, as this cellular infiltration does not differ essentially from that of ordinary inflammation, but we may assume that the intercellular substance in this case is more consistent than that of ordinary inflammatory infiltrations. There is also an induration due to a peculiar inflammation of the arteries, the coats of which, especially the intima, are the seat of thickening. The next step is the involvement of the lymphatics; these become the seat of an inflammatory infiltration, without a tendency to suppuration; for example, the indolent bubo. The next step is the affection of the skin and the mucous membranes, generally called secondary syphilis—a poor name, however.

Finally the bones and the internal organs are affected, constituting the tertiary manifestations. There are two specific manifestations, the mucous patch and the gumma. The mucous patch is generally met at the border lines of the mucous membrane and the skin, such as the lips, anus, vagina, etc. The infiltration and swelling of cells causes the slight elevation characteristic of the mucous patch. There is also a surface discharge from some. Gummata vary in size from miliary tumors to the size of an apple. They have a soft consistency,

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yield to pressure but resist crushing. The color of the gumma is from a grayish white to a grayish red. The gumma is characteristic of syphilis; but besides this, ordinary inflammatory lesions may exist. Changes may be met in the skin, mucous membranes, bones, especially the bones of the skull, also in the tibia and sternum; they occur also in the viscera, liver, testicles, brain, spleen, kidneys, lungs, etc. In infants pulmonary syphilis is, however, as frequent as that of any other organ. Syphilis has been happily compared by Hutchinson to the contagious exanthemata, smallpox, measles, and scarlet fever, as possessing all the peculiar characters common to this group of diseases, namely, it is communicated only from one diseased person to another healthy one; it has a stage of incubation before any sign of the disease appears; it has a stage of efflorescence, which, indeed, in syphilis, is prolonged and marked by relapses; it has a period of decline and sequlæ, the later tertiary lesions, which do not always occur, and during which the disease often ceases to be communicable. One attack confers immunity from another, often for life, always for a long period. Direct contact with the virus, with a surface capable of absorption, is essential to the production of the disease.

In the vast majority of reasonably well marked cases syphilis is as different from chancroid as night from day. A patient may have malignant scarlet fever and die in a day without a sign of eruption, but still he has scarlet fever, as no one denies. Even if one syphilitic chancre out of twenty were not indurated, the other nineteen would be amply sufficient to establish a rule. But the proportion is far larger, and there is perhaps no symptom of any disease more constant than is the induration of syphilitic chancre, yet the patient does not have syphilis because his chancre indurates, as was formerly taught; on the contrary, he already has syphilis before his chancre appears. If he did not have it, he could have no chancre at all, and the induration of that chancre is just as much one of the symptoms as is ulceration of the chancroid.

Clerc tells of a medical student who washed himself immediately after sexual intercourse, and on careful examination for several days subsequently detected absolutely nothing. Twen-

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ty-eight days afterward chancre appeared, followed by general syphilis. Hill relates a very important case bearing upon this point. A man in sexual intercourse tore his frænum at 4 A.M.; the wound bled freely; fearing possible infection, he called upon Hill during the same day, within twelve hours after the accident. To quiet his fears, although there was no lesion evident except the abrasion, Hill cauterized the surface freely at once with fuming nitric acid; the slough separated in due time, leaving a healthy surface, which cicatrized promptly. About one month after, the scar indurated; it never ulcerated again, but the regular manifestations of syphilis came on at the usual interval. Hutchinson saw a well marked case, in a physician, of two attacks of syphilis preceded by its characteristic syphilitic chancre. The same patient had had smallpox twice. Many other cases are found scattered through the literature of syphilis, and they go to prove that syphilis gets well, for until one attack is recovered from another cannot be acquired.

Diday concludes that the minimum time for the cure of syphilis is twenty-two months, and that when a syphilitic chancre appears twice in the lifetime of an individual, the second attack should not be treated until symptoms of secondary syphilis appear, as these may never come on, the whole attack consisting simply in syphilitic chancre. Tertiary ulcerations of the penis may be mistaken for syphilitic chancre.

Secretions capable of transmitting syphilis, by the inoculation of healthy subjects, are the fluid secreted by syphilitic chancre, mucous patches, any secondary cutaneous lesion, or mucous lesion yielding a discharge, and syphilitic blood drawn from a patient with an eruption, taken either from a papule or tubercle, or from the healthy skin between the lesions. Whether the blood of syphilis is poisonous in the intermediary periods between the eruptions, when the skin and mucous membranes are sound, is not yet established, but certain observations of vaccinal syphilis would go to prove that it is.

Inherited Syphilis. — If the father be syphilitic and the mother healthy the child seems sometimes to escape infection, probably because at the moment of impregnation the virus in the father, either from the effect of treatment or from a natural

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lull in the disease, was not in a state of activity, or because he had advanced too far in the tertiary stage to transmit it. Fathers with tertiary syphilis certainly, as a rule, where the mother is sound, procreate healthy children as far as syphilis is concerned. Where the father and mother are both diseased in the early stages, the child is invariably syphilitic. Where the mother alone has syphilis (except in the later tertiary form) the child is always infected unless the mother is under treatment.

Ricord and Bærensprung believe that, if ever, the child is rarely affected if the mother acquire her disease after the seventh month of pregnancy. A mother having borne a syphilitic child is herself immune, although she may present no symptoms of the disease.—*Colle's Law.*

Children acquire chancre of the lips from nursing women with mucous patches of the nipple, and, on the other hand, healthy nurses get chancre of the nipple by suckling children with inherited syphilis who have mucous patches of the lips. Smokers of pipes get chancre of the lips. Glass-blowers get syphilis in the same manner, as they work in sets of three at the same tube, passing it from mouth to mouth. Syphilis may be transmitted through a whole family from the use of the same spoons or cups passed from one mouth to another. Washer women become infected in cracks of the fingers through the virus contained upon soiled clothes. Wet cups, Rollet states, once started an endemo-epidemic of syphilis. Transplanting teeth has proved another source of mediate contagion. Catherization of the eustachian tube has done the same, as has also the operation of circumcision with instruments which were infected with syphilitic virus. Vaccination is a familiar instance of mediate contagion. Infection may occur in so mild a form that the patient may never know he has it; or, again, with such intensity that extensive lesions of the skin, bone and other tissues may come on within the first year with paralytic symptoms of great extent and severity.

Syphilis may manifest itself as a mild eruption after chancres; disappearing, possibly without treatment, and then (exceptionally, it is true) may lie latent for many years. In Fournier's case,

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a gentleman of seventeen had acquired chancre, followed by some secondary eruptions which were pronounced syphilitic. No further symptoms had appeared until the age of sixty-nine, fifty-two years after the chancre, when he had suffered from syphilitic caries of the upper jaw. At seventy-two he applied to Fournier on account of a gummy tumor of the thigh, which got rapidly well under the iodide of potassium. Now, in this case, had the patient died at the age of sixty-eight, he might, with seeming justice, have been reported as an instance of cure, for over half a century would have intervened since his last syphilitic symptom.

Syphilitic Fever.—The patient is liable to exhibit more or less marked symptoms of fever when the chancre is getting well, but it is not always present; when present as distinct fever it is marked by physical and mental depression, loss of appetite, etc. The type of fever may be remittent or intermittent, running up in the evening, according to Gintz, often to nearly 104° Fahr.

The cachexia of syphilis, which is always more or less present, is due to a diminution of the red blood corpuscles. Syphilitic affections of the skin leave certain general characteristics which stamp them as a class; usually they are well marked, and appear as (1) polymorphism of the initial lesion; (2) round form of patches and ulcerations; (3) livid color, like the meat of raw ham, then coppery (pigmented), then gray, then white; (4) absence of pain and itching; (5) earlier eruptions, superficial and general, usually symmetrical; (6) later eruptions in groups, involving the cutis vera; (7) scales, usually white, not adherent, superficial; (8) crusts, greenish black, irregular, thick, adherent; (9) ulceration with abrupt edges, adherent, not undermined, sluggish and bleeding easily; (10) cicatrix rounded, depressed, thin, non-adherent; white, smooth at first, often pigmented, then clearing off from the centre towards the circumference. To these (special) symptoms may be added alopecia, headache, osteocopic pains (worse at night), analgesia, anasthesia, indolent lymphatic ganglia, iritis, sore throat, mucous patches, etc.

Another symptom of syphilis which has been pointed out

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by several prominent medical men, and which I have found present in a large number of cases, is pain felt by the patient when the thumb or index finger is drawn down the front of the tibia, using a fair amount of pressure.

General treatment of syphilis should be commenced as soon as the diagnosis of syphilitic chancre is made. There is no advantage in waiting for an eruption. Still, early action is only justified by an absolute certainty of diagnosis. In all cases of doubt the honest surgeon must hesitate, and many cases are doubtful at first; in all such cases it becomes the duty of the surgeon and patient to wait for absolute proof of its presence, rather than treat a disease which may not exist. By following the opposite course we may throw doubt and discontent, even torture, into the subsequent life of the patient, who is constantly on the alert for any pimple, ache or pain, fearing it may be the delayed onslaught of the enemy. A few days of mercurial treatment might disturb the regular routine of symptoms or alter their readily recognized form. Another thing, if the diagnosis of chancre had been doubtful, how much more so would that be of the subsequent syphilis. The rule in all cases of doubt is frankly to tell the patient to wait. If he or she has not the grace to appreciate pure honesty, and must have something, give a placebo while studying the nature of the sore and developments. In the early symptoms of the disease mercury is especially potent; the iodides have little power over early syphilis. Mercury, properly administered, may be taken for years without injury. Sometimes a patient is found who cannot take mercury, not even in minute doses, owing to its producing a peculiar mental depression. Other bad effects are salivation and diarrhœa. The effects of mercury are produced no matter how the drug is employed; what we have to look at is the ease of administration, the prompt action of the drug, or the desire to produce or avoid some local useful or disagreeable effect. It is on this account that for treating general syphilis the method by the stomach is the best; seeing the patient has to take it at least for a year, he would absolutely refuse to use the following methods, such as hypodermic injections, inunctions, fumigations, etc. Warm baths

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and diuretics are useful for patients under any mercurial course in hastening the elimination of the drug. They ward off evil effects without interfering with therapeutic action. In the majority of cases the protiodide of mercury is most useful. I prefer the French granules, containing ¼ gr., made by Garnier, Lamoureux & Co., giving from three to four granules a day at first, then increasing or diminishing according to the constitutional effect.

Treatment of Late Syphilis.—Here we find the use for our iodide of potassium, either alone or with mercury, as the occasion may arise. I prefer the mixed treatment at least for the first six months of the second year. A favorite prescription I use is hydrarg. biniodid, gr. $\frac{1}{4}$, potass. iodid. $\mathfrak{Z}\frac{1}{2}$, tr. cinchonæ comp. $\mathfrak{Z}\frac{1}{2}$, syr. sarsap. comp. *q. s. ad* $\mathfrak{Z}\frac{1}{2}$, giving from one to two teaspoonfuls *ter. in. die.*

In addition to medicine, we must warn our patients regarding the laws of mother nature. Regularity of the habits, especially those of eating and sleeping, and of those involved in the performance of intestinal functions, is all important. It is not necessary to deviate from the ordinary diet. Excesses of all kinds are bad, even emotional, as fear, anger; excesses in strong drink, work, or venery. Bathing frequently, so as to keep the skin scrupulously clean; guarding against cold, singing, loud talking or continuous talking, especially in subjects with weak throats. Plenty of fresh air, exercise and light—change of air in some cases—is essential to the success of treatment, as from the mountains to the seaboard, or from the shore inland; six weeks being the time usually required to get the best effects. Cod liver oil, quinine, iron, etc., find ample space to vindicate their claims at some part of the treatment of most cases.

DISCUSSION.

Dr. A. C. Brooks.—The essayist has well concentrated a broad subject, but I would like to call attention to a curious fact in regard to the Lustgarten bacillus found in syphilis. This bacillus is found in the gumma of tertiary syphilis, as well as in the mucous patch of the secondary stage, yet it is

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inert in the former and active in the latter, which fact has influenced some to doubt its being the specific germ of this disease.

I would also make prominent that the initial lesion may, and often does, appear on the lips, fingers, nipples, or any other part where there is a broken skin, or mucous membrane that is exposed to the virus. In this manner a number of prominent physicians have contracted the disease from making examinations, and having a chancre afterwards develop on their fingers.

If any doubt exists in regard to diagnosis I would not begin active treatment until the second stage, as earlier treatment would mask the eruptive symptoms of the second stage.

The syphilitic child when born may present the fairest of skins and be apparently healthy, yet in a short time the mother will notice the child has "snuffles," and tenderness of the bones will be present, often papules on the soles of the feet and the palms of the hands, and "Hutchinson's" teeth will appear, all of which makes the diagnosis of hereditary syphilis apparent. Again the child may escape the symptoms and not develop the disease until puberty.

In a case of tertiary syphilis, with paralysis of both legs, that had taken large doses of potassium iodide without any improvement, I used gray oil, consisting of calomel and lanolin, dose $\frac{1}{10}$ c. c. hyperdermically, and the patient was under this treatment for a month with some improvement.

Dr. C. W. Prevost.—Speaking of chancre in regions other than genital, I remember a case in my dispensary service at the city hospital, of a young man about 19, who worked around breaker. He came in with a large sore on his lip; the edges indurated, a hard, cartilaginous mass. Questioned as to his past life, he gave a very good history; denied having anything to do with women. He had some mucous patches in mouth, and enlargement of post cervical glands. Diagnosis, chancre. He was given anti-syphilitic treatment, and directed to continue the same for at least two years. He passed out of my hands for a time, and later was brought to the wards of the hospital with fracture of tibia. He had developed some secondary symptoms and was put on mercury again, and the eruption disappeared. The source of infection seemed to be from a drinking cup. He stated that some of the workmen had had sores on their mouths, and I believe the patient was infected through an abrasion of the mucous membrane.

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THE THEORY OF THE EXTENSION AND RETRACTION OF THE NEURON TERMINAL.

BY DR. JAMES GEIST, WILKES-BARRE, PA.

READ DECEMBER 15, 1897.

Parks says, very truly, that the history of medicine is a history of error and discovery; and so it must continue, with, perhaps, the errors growing fewer and shorter-lived, and the discoveries greater and more rapid. Our art, though originally founded on a chaos of myth and fable, we believe to-day rests on firmer grounds; yet the theorist and skeptic, as well as the enthusiastic investigator, are ever necessary in the evolutionary process of sifting out the enduring facts of science. The sages of each age explain the phenomena of mind and matter to the satisfaction of the beginner in philosophy, but among the master-minds there always remain questionable points, which eventually lead to new discoveries, requiring new theories to reconcile the same old unchangeable phenomena and the newly discovered facts.

To such a theory applying to our present conception of the nervous system I invite your attention. Up to within a few years it was believed that the nervous system was made up of two distinct morphological elements, namely, nerve cells and nerve fibers. The cells were supposed to originate, send and receive and modify impulses, which were transmitted from cell to cell by fibers acting simply as the especial conducting agents. This presupposed a continuity of structure, that is, connected with each fiber, at one end, was a cell for sending impulses, and at the other end a cell for receiving them, the processes of both cells being believed to fuse with the axis-cylinder of the nerve fiber.

From the investigations of Golgi, of Cajal, of His, Waldeyer, Kölliker, and a host of others, we have now a more definite knowledge of the minute anatomy of the nerve cell and its processes, and all former suppositions have been put aside and replaced by the fact, that the entire nervous system is made

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up of a multitude of distinct and independent neurologic units, called by Waldeyer neurons.

The great variety of terms used to designate the same parts has rendered the subject somewhat confusing, but I shall briefly review and use those you have heard here before. Histogenetically the neuron consists of three essential parts: (1) the neuron body or nerve cell; (2) the neuraxon or axon; and (3) the distal terminations of the axon, called end-tufts, end-brush or end-bush. The nerve-cells form the central body of the neurons, and vary much in size, their average diameter being a little more than that of the white blood corpuscle. They are irregularly-shaped, most being spheroidal, some pyramidal, others spindle or flask-shaped, and still others globular. They all give off one or more fine processes or poles, and are therefore spoken of as multipolar, bipolar or unipolar. In most cells one of the processes continues a long way, becoming a nerve fiber, the longest from 60 to 100 centimeters; this is the axis-cylinder, neuraxon or axon. The other processes are coarser and comparatively short, called the protoplasmic processes, dentrites or dendrones. The entire neuron, therefore, is formed by a protoplasmic body, giving off several dendrones or none at all, and usually a single axon.

The dendrons branch irregularly and subdivide, but never anastamose. In some parts of the nervous system they have upon them little nodules or buds. These minute projections in the cerebral and cerebellar cortex are so numerous as to give them the appearance of frosted or feathery stalks. They are called gemmulae. The axon is usually given off directly from the neuron-body. It becomes clothed within a thin covering, the myelin sheath, and at various points gives off collateral branches. The axon and its collaterals finally end by splitting up into a number of fine filaments, which lose their sheath and form the end brushes or terminals. There are axons which terminate in a single free undivided filament. These filaments entwine themselves around the dendrones or their gemmulae, or around the cells themselves, if they have no dendrones, and in this manner the innumerable neurons are brought into intimate relations with each other.

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The function of the axon is to carry impulses away from the cell; it is a cellifugal fiber. The dendrones receive and carry impulses to the cell, and are cellipetal in function; but the cell itself may receive impulses direct from the end-tufts. Self-preservation is an important function of the cell-body. This it effects by absorption and assimulation of nutritive material from the lymph-spaces; the dendrones through the gemmulae, and the axons through the Ranvier nodes, also take part in this process. Within itself each nerve cell has a miniature brain, the nucleus, which regulates the nutrition of that entire neuron. Any part cut off from this nucleus degenerates and ultimately dies. Again, each neuron, though in relation with many others, does not respond to all the stimuli brought to it or near it, for it has the power to distinguish and responds only to a certain kind. Thus the entire nervous system is a mass of these neurons packed closely together and forming the most intricate relations, yet never any direct anatomical connection with each other. The neuronic mass receives impulses from within and without the body, transfers and modifies them, and sends out the impulses necessary to properly control all special tissue functions, and keep the individual in correct harmony with his surroundings.

The nerve cells are massed together in the brain and spinal cord and form the gray matter, while the axons as distributors make up the white matter and the cranial, spinal and sympathetic nerves. To follow the course of an impulse, as it passes through a series of neurons, the various nerve units are named according to their location, as central, intermediary and peripheral; or, to be more accurate, from the location point of the cell-body and the termination of its axon fibrils. Accordingly, we have such terms for neurons as cortico-spinal, cortico-pontine, pons-cerebellar, cerebello-spinal and the like. Sometimes a neuron is in relation with another through an intermediate short one; the latter is called an associative neuron.

Upon this increasing knowledge of the nature and relations of the neurons has followed the fascinating theory that the free terminal filaments of the axon have the power to extend, so as to touch or approximate the dendrons of the next cell, or

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the cell itself, sufficiently to allow impulses to pass or leap across the intervening space, and again to retract so that no energy whatever can pass between the two neurons.

A case of transient hysterical paralysis best illustrates the supposed behavior of the neuron terminals. The neurons of the motor area of the cortex present the protoplasmic extensions, the dendrons, passing toward the surface, also the axon extensions downwards, which become nerve fibers that pass through the white matter of the brain, the internal capsule, the crus, the pons, the medulla and the cord, and terminate in the interior horn of the cord in end-tufts. Through these end-tufts the cortical cells are brought into relation with the motor nerve cells of the spinal cord, whose axons reach out into the muscles. Here, in the interior horn of the cord, must be located the lesion of this form of hysteria, which consists of an abnormal relation between the end-tufts and the dendrons.

Suppose that, from an emotional or other mental or physical shock, the neurons of the arm area in the cortex retract their processes, so that the end-tufs in the cord are no longer in relation with the spinal neurons. Impulses cannot pass between the cortical and peripheral sets of neurons, and the arm is paralyzed and remains so until, as the result of suggestion or spontaneously, the terminals again extend, and assume their normal relations. In no other way can hysterical palsies and hysterical anæsthesias be so readily explained.

In all branches of science it frequently happens that after certain leading facts are established, their meanings or pointings to other facts or possibilities occur almost simultaneously to different students working along the same line of research. In the history of this theory we find that in 1890 Rückhard, in a paper in the *Neurologische Centralblatt*, first suggested the possibility of nerve cells having an amœboid movement, and hinted how, if it were found a fact, we could make a more reasonable interpretation of the phenomena of hysteria. Lepine, in 1894, without any knowledge of Rückhard's theory, advanced the same view, in a paper on "A Case of Hysteria of Peculiar Form." In his effort to account for the various shifting phenomena of his patient, he advanced the idea that

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the neurons were capable of movement to such an extent as to vary the degree of their relation to each other. Six months later, Mathias Duval, knowing neither the views of Rückhard nor those of Lepine, advanced the same theory before the Societe de Biologie. And again, the thought occurred independently to Dercum, who read a paper on the "Movement Theory" before the College of Physicians in January, 1896.

These papers are receiving considerable attention, and references to the last one in particular are frequently made.

The two great histologists, Kölliker and Cajal, oppose these views. Cajal contends that the nerve cell processes do not move, because he found that in animals, whether killed by chloroform, hemorrhage or strychnia, the terminal branches of the nerve cells of the cerebellum, acoustic ganglia and optic lobe always presented the same shape and degree of approximation to the cell bodies, and because the terminals of the retina and optic lobes in reptiles also presented the same appearance, whether the animals were killed after being kept in darkness or after prolonged exposure to sunlight. While Cajal opposes the theory of the movement of the neuron, he believes that the neuroglia cells possess a great degree of mobility; he points out that the neuroglia cells of the cortex are at times stellate and at others much elongated. Their processes have numerous short arborescent and plumed collaterals. He says two phases of these cells can be observed: first, a stage of contraction, in which the neuroglia cell-body becomes enlarged, while the processes become shortened and the secondary branches disappear; secondly, a stage of relaxation, during which the processes are again elongated. He further maintains that the processes of the neuroglia cells form an insulating material, and that during the period of relaxation they penetrate between the axon filaments and the dendrons and thus render difficult or impossible the passing of nerve currents. On the other hand, when the neuroglia cells are retracted they again allow the various terminals to come in contact. Cajal, therefore, admits the movement of the terminals, only making it passive where others believe it to be active.

There is on record a positive observation by Weidersheim,

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a German investigator, who actually saw the nerve cells move and change their shape in the æsophageal ganglion of the living animal leptodora hyalina, an entomostracan. As this ganglion receives the fibers of the optic nerve it must be regarded as the brain of the animal. From this fact it does not follow that the nerve cells of vertebrates also have an amœboid motion, yet I think it should incline us to favor the idea that at least a very minute amount of motion in the neuron terminals is probable.

Very interesting experiments were made by Hodge, who compared the neuron bodies of the brains and spinal ganglia of sparrows and swallows shot in the morning with those of others shot in the evening, after a day of hard flight, and found definite fatigue changes. These he verified by similar experiments in other birds and in bees. He also produced fatigue, by electrical stimulation, in frogs, cats and dogs, and found changes similar to those resulting from normal daily activity. In the exhausted cells the nuclei were smaller, took a deeper stain, and were very irregular in outline; the protoplasm was shrunken and did not stain so readily. There must be other changes that as yet escape our powers of observation, but these are sufficient for us to conclude that the healthy neurons are in their best condition for functional activity when the volume of their cell contents is greatest and when their processes are undoubtedly extended so as to be in relation or contact with each other.

Assuming now that the terminal portions of the axons, and possibly also of the dendrons, do move, we can readily explain all conscious appreciations or perceptions. A certain series of sound waves fall upon the tympanum; their peculiar energy is conveyed, perhaps unchanged, through the ossicles, the secondary tympanum, and the perilymph, to the nerve cells of the spiral ganglion of the cochlea, or the peripheral auditory neurons; the changes produced in them affects the relations which their axon filaments bear to the neurons in the auditory nuclei in the medulla, and these in turn affect the central neurons in the auditory area of the cortex. We can conceive of these changes in the degrees of relation, extensions or approximations of terminals, to vary, just as do the sound waves, so beau-

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tifully shown by the movements of the particles in the glycerine film. (Experiments shown by Prof. De Motte in his lecture on "The Harp of the Senses.") The same sound waves always cause the same delicate adjustments of the terminals, just as it causes the same motions in the film. In a similar manner all knowledge of the external world is acquired, through these cortical neuron combinations, which correspond to the physical impacts upon the various specialized sense organs.

The power of retaining, recalling and recognizing knowledge gained in the past can also be accounted for by this theory. A certain sequence of sound vibrations, as of a familiar air, fall upon the peripheral auditory neurons, and cause the cortical terminals in the auditory area to assume a corresponding sequence of relations; if now the order of the changes, as well as the changes themselves, are exactly the same as have previously occurred, the ego recognizes it as something heard before. This is an act of memory. We would naturally expect the degree of the excitation of the neurons to depend upon the intensity of the physical impacts upon the peripheral receiving apparatus. And it is very probable that the number of cortical neurons roused into action varies greatly, and also that the movement does not limit itself to the auditory area, but is diffused to adjoining areas and through associated neurons to areas quite distant. So that, while the sequence of musical sounds at first only suggests the familiar air, a little later, when the movements have diffused as far as the visual area, and reformed old combinations here, we have added a visual memory of the familiar face of the person who sang, or of an instrument with its surroundings.

If old combinations are reformed, not because of impressions coming from the peripheral neurons, but from energy evolved in the higher cells themselves, through an effort of the will, it is a mental conception. And so imagination must be the power to reproduce neuron combinations of former perceptions, modified according to wish or fancy.

When the substance of the cortical cells from normal use has diminished to a certain point, unless prevented by will power, there comes a time when the terminals retract, and the

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majority of neurons are no longer in relation to each other, impulses do not pass, and unconsciousness or natural sleep is the result. During this period of functional rest the wasted cells are again replenished until their extending terminals touch their neuron neighbors and we awake with new nerve force. In other words, all the terminals are again so adjusted to each other that the slightest impact upon any of the peripheral neurons is carried up to its own particular area in the cortex and from here diffused. This is consciousness.

The change and trend of our thoughts must also depend upon neuron motion, for from the moment we awake the stimuli from without vary, and likewise lead our thoughts; and therefore it is that when we wish to dwell upon one subject we must be able, by an effort of the will, to shut out, in a measure, these stimuli or favor it by the quiet of our surroundings. Habits are the inherent tendencies of the neurons to assume exactly the same relations they have had before, under similar conditions, until certain acts are done with so little effort of the will that we say they are automatic.

It has been suggested that each blood corpuscle has a nervous connection with the central system, and this appears reasonable, when we consider how promptly its various pathological stages are recorded by the chill, fever and sweat, when it is inhabited by the hæmatozoön malariæ.

As the nucleus of the nerve cell has the regulating and controlling power over the neuron, so also have the nuclei of other cells a similar function, but more limited in degree, depending for their harmonious action upon a connection in some way with the higher specialized cells of the central system. In the case of the blood cells, which are now known to have nuclei, this connection may be through contact with each other and with the free end-tufts lining the vessel walls.

It is very probable that the anæsthesia of nitrous oxide gas, of ether, and chloroform is brought about by causing a retraction of the central neurons controlling consciousness, sensation and motion, either through the direct effect upon the corpuscles, or by the corpuscles acting as vapor carriers to these special neurons.

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That extraordinary state of partial sleep, hypnosis, becomes less strange if we look upon it as a condition in which only a portion of the neurons have their terminals retracted. It is brought about by getting the subject to stare fixedly at an object, and at the same time continuously suggesting sleep. Because of the efforts of attention given through the eye and ear the neurons of the corresponding areas in the cortex are adjusted in certain relations with each other. Soon the neurons in the visual area, from fatigue and the suggestion of sleep, retract their terminals and partial sleep begins. The operator now suggests deeper and deeper sleep, and gradually other neurons retract their processes, until only those of the auditory area remain in contact and limit the field of perceptions in the subject. The words of the experimenter now cause certain movements of the neurons in the auditory area, which are transmitted to whatever specialized neuron group they appeal; if it be to the motor areas, the subject will perform automatically the actions suggested by the words.

Hypnotic lethargy means that the retraction of the cortical neurons has been so general that motor relaxation occurs, because of the retraction of the terminals in the spinal cord. In hypnotic catalepsy there is established such great contact or increased proximity between the cortical and spinal neurons beyond the normal, that there results an enormous increase of muscle-tonus.

By the aid of this theory various pathological conditions can be made clear and comprehensible, as a few phenomena of insanity will show.

An hallucination can be defined as the formation of an old neuron combination, representing a former perception or conception, the combination being the result of diseased neurons, and not in response to normal stimuli either from without or within. The combination representing an hallucination reacts in such a manner upon the other neurons as to give rise to the belief in the reality of the vision, sound, or other special sense manifestation.

An illusion is a combination among the neurons, so faulty as to lead to an imperfect recognition of the object perceived.

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When a rope is mistaken for a snake, the physical impacts are normally received by the peripheral sensory apparatus, but because of the diseased conditions of the neurons these impacts cause imperfect and erroneous combinations in the cortex. This conclusion is justified because, from the investigations of Berkeley, it has been shown that the dendrons and gemmulæ in particular become diseased and atrophied from various toxines, and especially from alcohol.

Reference was made to this subject in a former paper read before the society during the year. It seemed plausible, and I became interested in it, and have tried to give the substance of the literature I have thus far found. A theory as first presented can never be wholly true, but if, eventually, it serves as a guide to truth, we must praise the bridge that carried us over.

I believe that some day the definite anatomical changes underlying the phenomena of epilepsy, chorea, tetanus, rabies and their like will be found along this line, based on further knowledge of the nature of the neuron. I have in the main followed the ideas as given by Dercum, and while these may to some seem pure fiction, I hope I have at least reviewed a few anatomical facts with which it is important that we keep acquainted.

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MEMOIR OF DR. GEORGE H. KIRWAN.

Never were truer words spoken of a man than at the meeting held to take action on the death of Dr. George H. Kirwan, when one of the speakers said: "To appreciate him, you had to know him well." Doctor Kirwan had learned the great secret of winning the loyalty of men whom he admired by drawing the line between his acquaintances and his friends. He did not make friends easily. He was reserved and slow in making acquaintances and just in his estimate of men. His friendship was not easily won, but once won it was a friendship forever, for he was staunch and true. It was the true friendship that clings closest in the hour of misfortune, and gave the true handclasp when it was most needed and would do the most good. The reserve was a cloak through which acquaintances could get no glimpse of the manliness of the man underneath, but his friendship threw aside that cloak and friendly eyes alone could see. To know him was to honor him.

Doctor Kirwan was born at Hawley, Wayne county, Pennsylvania, July 21st, 1856, and was the only son of Martin F. and Winifred Morris Kirwan. His parents came to this city when he was nine years old. He was educated in the public schools and the private school taught by W. S. Parsons, going later to Wyoming Seminary, where he graduated with honors. He entered, shortly afterward, Dr. Tenner's drug store, at Market and Franklin streets, and from there to the drug store owned by his father; thus giving him a practical knowledge of drugs which was of service to him later in his practice of medicine. At the age of seventeen he passed an examination for West Point, receiving the appointment, but his mother refused to let him enter. He began the study of medicine in February, 1879, under Dr. John T. Doyle, and graduated May 16, 1882, from Columbia College, New York, and began the practice of medicine in June of that year in this city.

Dr. Kirwan was particularly interested in surgery, and all who came in contact with him on this subject are aware of his thorough knowledge of the surgery of the day. In preparing

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for an operation the most minute portions were looked into; theoretically the operation was gone over time and again. His hobby was antisepsis, and the preparation of a patient could never be too thorough for him. His ambition was to excel in gynecology, and had he lived he would have ranked with the highest.

His great mind had also the power of invention. This was proven in the "Kirwan Electrical Station Indicator," which was patented August 28, 1888, and was designed for announcing in advance, in the interior of the car or coach, the next street or station at which the train or car would stop. It was an electro mechanical machine, and was tested on the Lehigh Valley Railroad. The following from the New York *Sun* of March 1st, 1889, explains the device:

"Dr. George H. Kirwan, of Wilkes-Barre, has invented a station indicator to be used in the cars, which is an ingenious piece of electrical mechanism, and which has had a very satisfactory test. The apparatus occupies a prominent place in the front end of the car, over the door, and after one station is passed it drops a white card with the name of the next station in large letters. The machine had a practical test on a local train between Wilkes-Barre and Mount Pleasant a few days ago, and the railroad men who were experimenting declare it is a great success."

This invention did not prove a remunerative article for him, although it did all the work for which it was intended; but it was not a labor-saving device, and railroad men in consequence claimed it a luxury.

His inventive mind is again evident in what is known as the Kirwan Emergency Bag, of which the *Railway Surgeon Journal* editorially said:

"The doctor has evidently given this subject a great deal of consideration, and deserves much credit for his efforts in attempting to prepare something of this character that is suited to the needs of the average railway surgeon. We agree with the doctor when he says: 'If a railway surgeon keeps such a case at hand ready for instant use, many lives may be saved that otherwise might be lost by the delay incident to the gath-

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ering together and preparation of instruments, dressings, etc., after being summoned to a severe case of railway injury.'"

For many years he was jail physician, also pension examiner, and surgeon for the Pennsylvania Railroad, a position he held at the time of his death. He was a member of the Luzerne County Medical Society, Lehigh Valley Medical Society, American Medical Association, State Medical Society, American Surgical Association, and Railway Surgeons' Association. He was particularly proud of being appointed a member of the hospital staff, but had little opportunity to enjoy much of its benefits, as his death occurred so soon after his appointment.

Among his many successful operations was the removal from a patient of an ovarian tumor which was the second largest tumor ever removed in Pennsylvania, the weight being eighty-one pounds.

His literary and constructive abilities were evident in his many papers to this society, of which some were the following: "Antiseptic Dressings," "Hemorrhoids," "Modern Surgery of the Pelvic Floor in Women." These papers are and should be appreciated, for they reflect credit not only upon him who prepared them, but upon this society, which was honored by his membership. He was careful in his preparation of a paper. No labor was too hard, no research too difficult, and no problem too abstruse for his solution. His care, thirst for knowledge, and patient plodding were evident in his paper on "Modern Surgery of the Pelvic Floor in Women." He had a concensus of opinions on mooted questions from one hundred leading American gynecologists. On his paper on "Hemorrhoids" he had letters from all the leading men in the world. This constituted weeks of labor, but it proved the systematic painstaking qualifications of the man.

Doctor Kirwan, on January 22, 1895, was married to Miss Maud Ashbrook, of Philadelphia. Only a short time he lived to enjoy the society of his wife, for on December 28th, 1895, he died of appendicitis, and a career of usefulness was ended; "the heart of a true man grew still, a bright light went out."

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MEMOIR OF DR. L. E. WEISS.

The Luzerne County Medical Society again has the sorrowful duty of recording the death of another of its members.

At a special meeting held March last, 1897, it was resolved to express condolence to the family of our stricken fellow member, Dr. L. E. Weiss, and prepare a short sketch of his life to be reported to this society.

To many the death of Dr. Weiss was a surprise, being a man of strong physique, who had always led an out-door life, and had always enjoyed perfect health up to March, 1895. At this time, without any known cause he would become fatigued quite easily and had an anæmic appearance, which gradually became more marked and soon evidences of pernicious anæinia were apparent. He gradually grew worse and during the summer of 1895 he was unable to work, but during October he rapidly improved and in a short time was apparently as well as ever. He was soon in active practice again and felt well until December, 1896, when the disease returned and caused his death on February 27, 1897. Dr. L. E. Weiss was born in Nescopeck, Pa., February 12, 1859. He attended the public school and took a course in the Orangeville Academy. He worked on the farm up to the year 1882, when he decided to enter a medical college. Entering the Jefferson Medical College in 1882 he graduated from that institution in the spring of 1884. He at once opened an office at Hobbie, Pa., where he was engaged in practice until November, 1893, when he with his family moved to Miner's Mills, where he continued the practice of his profession.

Dr. Weiss was of a quiet, genial disposition, holding the confidence and esteem of his brother physicians and the many people in his practice.

He was married September 22, 1886, to Miss Ella Harter, of Hollenback, Pa. His widow and one son survive.

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Dr. Weiss was an ardent supporter of the Luzerne County Medical Society. He was also a member of the State Society.

The committee recommend the adoption of the following minute:

WHEREAS, It has been decreed by an allwise Providence to remove by death one of our fellow members, Dr. L. E. Weiss, of Miner's Mills, therefore,

Resolved, That in the death of Dr. Weiss our society has lost a valued friend, and that we offer our heartfelt sympathies and condolences to the bereaved family for their loss.

Resolved, That this report be spread on the minutes, and a copy be sent to Mrs. Weiss.

G. T. MATLACK, M. D.,
S. P. MENGEL, M. D.,
WALTER LATHROP, M. D., } Committee.

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FOR THE

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FOR THE

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THE RETIRING PRESIDENT'S ADDRESS.

DR. JOHN B. MAHON, PITTSTON, PA.,
JANUARY 12, 1898.

The custom of this society demands from its retiring president at least a parting word, however briefly it may be spoken. But for this, I should much prefer to remain silent, listening to others whose names appear upon this program. But I should seem ungrateful if I failed to express my appreciation of the honor conferred upon me, in that I have been permitted to serve this society as its presiding officer during the past year, and I should be negligent of duty as one of its members if I refused to utter criticism concerning any matter calculated to impair its success and usefulness; or, on the other hand, to speak words of encouragement and hope for the future if such confidence in our organization seems warranted.

At the close of this ninteenth century, medicine and surgery stand upon an eminence that challenges the admiration of the world. We believe we are within safe and conservative bounds when we assert that no other profession can boast of more rapid progress or a more noble record. Superstition is rapidly yielding to the onward march of medical science; charlatanism is being pushed to the wall by the search-light of truth; the nauseating and harmful mixtures that constituted theraputics in former years have been supplanted by a refined system of medication, culled after untold hardships and patient investigation on the part of devoted men from God's great storehouse of medicinal agents. The fear of the operating table and the surgeon's knife has been almost wholly dissipated by that most merciful of all human agencies, anæsthesia, while innumerable maladies once considered dangerous and fatal now acknowledge the supremrcy of scientific medicine and have well nigh relinquished their warfare upon the human race.

The triumphs achieved in the domain of surgery not infrequently border upon the miraculous. It is justly claimed that in the first thousand ovariotomies performed by him, Sir

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Spencer Wells added not less than twenty thousand years to human life, after deducting the years lost by the fatal cases, while Keen declares that with our more modern antiseptic methods the time would be increased to thirty or even thirty-five thousand years.

It is within the knowledge of every physician here to-night that medicine and surgery do possess the power to snatch from the very jaws of death thousands of precious lives otherwise doomed to untimely graves and restore them to home, friends and loved ones for many, many years. There comes vividly to my mind the case of Mrs. S.——, a resident of my own city, who was seen by our lamented colleague, Dr. Murphy, in consultation with me more then two years ago. It was his opinion as it was mine that the time for surgical interference had gone by and that the patient would die of cancer within a fortnight. As a last resort and with scarcely any shadow of hope left she was removed to a suitable place and hysterectomy performed, with the result that the estimable wife and mother has been restored to her family, and is to-day the embodiment of robust health and vigor.

But it is needless and would be even tedious to multiply cases of this kind. The simple fact is they have become so common as no longer to excite astonishment; and the public, emboldened as it were by the achievements of modern medicine, to-day almost demand of the physician that the life of this child shall be saved though it be in the final grasp of that arch enemy of childhood, diphtheria, or that that son or daughter, father or mother shall be rescued, notwithstanding the fact that malignant disease seems to be clutching the victim with a final and fatal embrace.

In a recent address delivered before the American Medical Association, Professor Keen said: "By making it possible to perform an operation without pain and almost without danger, organ after organ of the body has been made accessible to the modern surgeon with almost invariable success. Scarcely twenty years ago Erichsen, in a public lecture, declared that surgery had nearly reached its final limits, and that the brain,

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the heart and the lungs must ever remain inacessible to the surgeon's knife.

"But now these organs are constantly operated upon and even portions of them removed. From this safety and painlessness there has been born an audacity unknown to the men of a former generation. Diseases then thought to be incurable are now vanquished every day and organs thought to be inaccessable are attacked with an impunity perfectly marvelous."

And even since the above words were spoken by Dr. Keen another long stride has been taken in the field of surgery and the medical world startled by the bold and brilliant operation performed by Dr. Karl Schlatter, of Zurich, upon Anna Landis, his patient, in the succèssful extirpation of the entire stomach, necessitated by extensive disease of that organ. During a recent visit to Philadelphia I found in a hospital there a patient who was awaiting this operation, and it is not improbable than this will soon become an every day occurrence for the relief of a class of invalids hitherto regarded as incurable.

As a further means looking to absolute asepsis in surgical operations, plans have been submitted and it is proposed in certain hospitals to erect within the modern operating room an air-tight glass compartment within which is placed the patient, operator and assistant. The air in the operating cage is then slowly exhausted and replaced by air conveyed through a tube into a vessel filed with a strong antiseptic solution, thus rendering aseptic every particle of the atmosphere coming in contact with the field of work.

The chief obstacle to this procedure is found in the difficulty of rendering sterile the entire body of the patient preparatory to operation. If human ingenuity shall finally eliminate this hindrance it is scarcely to be doubted that the work of the modern surgeon is practically limitless, and that new and at present unthought of surgical triumphs await the operator of to-morrow.

Admitting, then, the indisputable fact that medicine and surgery have accomplished all this and even more, what conclusions are to be drawn? Are we to believe that the mortal has already attained immortality, and the corruptible body put on

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incorruption? In other words, has our profession reached the mark and prize of its high calling? Are we prepared to put off our armor, lay down our weapons of warfare and rest from our labors?

For answer let us look about us and we shall behold a spectacle that is well nigh appalling, and yet one that should nerve every true physician from the vantage ground already attained to more heroic effort, to more assiduous devotion to study and investigation—if need be to greater self-denial in our struggle to overthrow contagion in its myriad forms, in order to promote the health and happiness of our fellow mortals.

Disease stalks abroad everywhere; health is the exception, not the rule.

Paraphrasing a sacred axiom we might say: Wide is the gate and broad is the way that leadeth down to disease and untimely death and many there be which go in thereat. Because straight is the gate and narrow is the way that leadeth unto health and long life and few there be that find it. Today within the confines of our own Keystone State an estimated army of twenty thousand consumptives, with hectic cheeks and hollow eyes, stretch forth their white, shrunken, skeleton hands toward our fraternity, beseeching redemption from their impending doom, an untimely and in most instances an early grave.

Another army scarcely less numerous is keeping time and marching to the funeral dirge of specific disease, and with even less of hope to brighten their existence; for with these unfortunates the awful thought comes home to them that their offspring, if such they have, cannot escape the inexorable law of heredity, but must have visited upon them literally unto the fourth generation the curse of erring parentage; while the consumptive, thanks to applied science, may baffle the encroachments of that dread enemy of mankind, tuberculosis, and attain his allotted three score and ten years, enjoying a fair degree of health.

Again there appears upon the scene a mighty host aggregating, possibly, ninety-five per cent of the civilized human race, and the number is increasing, all peering through discs

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of glass called spectacles, and who, deprived of this aid to their vision, would be well nigh helpless because sightless. And still as many more physical and mental dyspeptics, whose pitiable condition is the direct result of erroneous living or well known abuses, whose victims, if not already inmates of the madhouse, are thronging the border land of hopeless insanity.

An eminent authority recently declared that insanity and various other nervous disorders are on the increase throughout the civilized world and offered the following explanation: "This is due mainly to the great rush for position and the acquisition of wealth which the conditions of the present time require. Before one is barely educated the struggle begins. Competition is very sharp and men must strive, fight and worry to keep up. If they fall behind they are apt to lose. This constant anxiety over the probable outcome of one's efforts sends many a man to the insane asylum. And too many are constantly striving for what they can never attain, and if they do not actually shorten their lives by many years they die finally with ambitions still unsatisfied, and the goal for which they have sacrificed peace of mind, health, happiness and even life itself, unattained."

With these facts confronting us and with many other pathological conditions, such as cancer, benign and malignant tumors, etc., but little understood, there can be no middle ground for the conscientious physician.

The fight must go on and on until the last secret hiding place of these lurking disease germs has been laid bare, its occupants destroyed, and man once more stands forth in the image of his maker, with physical and mental equipoise, emancipated from the thraldom of hereditary and contagious disease.

The physician of the future will be a practioner of medicine, but more than this will be required of him. Endowed with superior educational attainments and clothed with sufficient temporal power to enforce obedience to his just mandates, he must, in the strictest sense of the word, be a teacher of the masses in all things appertaining to the laws governing hygiene, physiology, bacteriology—in fact, sanitation in general. His mission must be to prevent rather than to cure disease.

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The efficiency and value of well directed medical intervention in preventing threatened, or stamping out existing epidemics, has been so frequently and so conclusively proven as to preclude controversy. It is asserted that a physician of New York, some years ago, by the early recognition of cholera germs prevented the contagion from obtaining a foothold within the city limits. To attempt to place a commercial estimate upon an act of this character would be an insult to humanity when the question of lives saved is taken into consideration. It was computed however, that had the epidemic once found lodgment among the people, millions of dollars would have been lost to the city by its destructive influence upon commerce. And yet it is not recorded that the people of the metropolis were particularly eager to extend even a vote of thanks to the humble physician who had rendered them this service, to say nothing of a more substantial recognition.

Certainly the time can not be far distant when the inhabitants shall learn that in every city and in every town it pays from a strictly business standpoint to maintain by adequate financial support an intelligent, efficient, wide-awake sanitary department, with properly constructed laboratories for the speedy detection, investigation and prevention of all forms of contagion, and this department controlled by men thoroughly versed in the various branches of medical science.

And now, coming nearer home, permit me to refer briefly to our own Luzerne Connty Medical Society, and to some of the work done by its individual members.

Not having been myself a contributor to the valuable original literature to be found upon the shelves of our library, I can speak with greater freedom concerning its worth; and I take especial pleasure in testifying to the personal advantage gained, and benefits derived from the gifted pens of my colleagues. I said at the beginning that I appreciate the honor of having been permitted to serve this society during the past year in the capacity of presiding officer. I repeat the assertion with deepest emotion and profound reverence, for I stand to-night in the position once occupied by our honored dead: Crawford, Mayer, Murphy, Davis, Underwood, men whose noble lives have been

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a boon to mankind and whose educational attainments have shed lustre upon the profession of medicine; but I would not withold, until the grave has closed over them, words of praise for those of our living members who by patient study and laborious preparation have presented to this society, from time to time, essays upon abstruse medical topics that have interested and instructed each one of us, and made us, one and all, better able, yes far more capable to discharge the exacting duties of our calling.

Go to our library to-day and you will find there a collection of literature, productions from the different fellows of this society, and many of them younger members too, that would put to shame the list of text books employed a quarter of a century ago in any one of the best medical colleges throughout our land. Scarcely a topic will be found within the domain of practical medicine to-day that has not been treated comprehensively and practically, so that a student of medicine, if he had access to no other books, might glean, from a thorough study of these works, a not inferior knowledge of the healing art.

During the past year we have had presented exhaustive papers and discussions upon the following subjects: "Hygiene of the Jews," "Pernicious Anæmia," "Diabetes," "Intubation," "The Modern Conception of the Nervous System," "Operative Interference in Epilepsy;" "Measles," "Treatment of Fractured Skull," "Treatment of Phthisis," "Mastoid Disease," "Traumatic Neurosis," "Placenta Previa," "Cerebral Localization," "Double Consciousness," "Serum Therapy," "Apoplexy," "Shall Luzerne County have a Sanitarium for the Treatment of Tuberculosis?" "Hematazoön Malaria," "Tetanus," "Acute Diseases of the Heart," "Syphilis," "The Theory of the Extension and Retraction of the Neuron Terminal."

Some of these articles have attracted widespread attention from the medical fraternity of our own country and at least one has been translated in a foreign language for the benefit of the profession of that land. Should there be any of our number who lack the inclination or the ability to present in abstract form a pen-picture of these more abstruse topics, surely there is not

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one among us who may not by the exercise of ordinary powers of observation, find in our daily practice some exceptional if not strange manifestations among our medical and surgical cases that will, even though presented in the simplest and non-technical language, prove interesting and instructive to all.

Again the effort now well under way to establish a well equipped medical library and reading room for the benefit of the profession, appeals strongly to every progressive physician to give the project his hearty coöperation; and he can do this in no more effective way than becoming an active member of our organization.

Therefore, if an experience of some fourteen years' membership warrants me in offering a word of advice especially to the younger or more recently elected members, I would say to-night, renew your allegiance to our order. As a means of social diversion from the ardous duties of routine practice it is profitable; but as an agent for sharpening the intellect and keeping you momentarily prepared for the constantly recurring emergencies that daily beset the busy practitioner it is invaluable. More than this, its tendency is to bind together, solidify and harmonize whatever discordant elements may still exist among our craft, thereby lending strength and dignity to our chosen profession obtainable in no other way.

And if I may presume to offer a single suggestion to older members I would say, the future strength and usefulness of our society will depend largely upon the reciprocal and uniform kindness and consideration practiced among us. I must feel, you my brother must know, each one of us must have abiding faith that in so far as our conduct is just and honorable we have the complete assurance that we can turn with a full measure of confidence to this fraternal band for sympathy, encouragement and protection. If I were to choose a motto to guide us throughout the new year upon which we are now entering, and, indeed for all time, I would select the words of St. Paul in his epistle to the Romans: "Be kindly affectioned one to another with brotherly love; in honor preferring one another." (Rom. 10-12.) Let this be the ruling spirit in all our meetings and in all our discussions; carry it with us when we meet in

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consultation at the bedside of pain and suffering; adhere to its principles in speaking of the short-comings or lack of professional attainments in an absent brother and it will work miracles as an antiseptic and germicide in eradicating the microbes of professional jealousy—a disease that has wrought untold mischief to our calling in the past. But like small-pox, plague and diphtheria, this form of pestilence has had its day and the medical fraternity no longer feels disposed to tolerate this species of piracy among its followers.

We have reached to-night another mile-stone in the history of our society, but since our meeting a year ago death has invaded our fold and removed from among us Dr. Weiss, of Plains, an honored member.

Aside from this the "shifting sands of time" seem to have wrought little or no change. And yet I observe a few new faces. It is not however, within the space of a week, a month, or even a year that marked changes are noticeable. But let us recall the conditions a decade ago and if we give the subject serious consideration we cannot but be startled at the retrospect. Scarcely one-third of those who then gathered about this festive board are with us to-night, and of those who do remain, had we not met from that day to this, we should scarcely recognize our former selves in the slackened gait, the whitening hair and beard, the deepened furrows and the more serious demeanor now presented. Other changes perceptible only to our own consciousness perhaps, as the neuralgic dart, the rheumatic twinge, the periods of insomnia and increasing absent-mindedness are the beacon lights thrown out warning us that the mechanism of our physicial bodies and the delicate textures of the nervous system are beginning to feel the strain of unceasing toil, in season and out of season, incident to the life of a busy practitioner of medicine.

All this warns us that the pale horse and his rider are not far in the distance. Possibly by putting our ear to the ground we may catch the sound of the clatter of his hoofs as he speeds his way hitherward. And even though we may elude his pursuit or evade the swing of his scythe for another decade or a

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score of years, yet we know he is a sure horseman and a relentless foe and that sooner or later he will bring us to bay.

But if we have fought a good fight and kept the faith; if we have tried, each in his own sphere, as best we may with our human imperfections to follow in the footsteps of our prototype, the only perfect physician, the lowly Nazarene; if we have sought to heal the sick, bind up wounds, assuage suffering and sorrow, hearkened to the appeal of charity, dispelled superstition, inspired faith, thereby hastening the era of peace and good-will on earth toward men, surely we shall

"Go not like the quarry slave at night
Scourged to his dungeon, but sustained and soothed,
By an unfaltering trust, approach the grave
Like one who wraps the drapery of his couch
About him, and lies down to pleasant dreams."

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THE USE OF THE SALINE SOLUTION.

BY DR. JOSEPH GOLDBERGER, WILKES-BARRE, PA.

READ FEBRUARY 2, 1898.

Although our knowledge of the physiological action of the saline solution is the result of comparatively recent studies, its use dates back more than half a century. Joehnichen of Moscow, (1) used it in 1830 in the treatment of the algid stage of cholera. It was not, however, until 1881 that the use of saline infusion was established on a scientific basis. In that year Schwarz, as the result of experiment, declared that death following hæmorrhage was due not to the loss of blood corpuscles but to a fatal lowering of arterial pressure. Dogs bled until no more blood would flow and apparently dead were revived by copious injections of salt solution. Since that time the saline infusion has been steadily gaining in favor with the profession.

Composition. The simple or physiological salt solution, consisting of six grammes of sodium chloride in one litre of water, is the one in most general use. The compound solution is not much used except in hospital practice. Various formulæ have been introduced, such as Ringer's solution (2) which consists of 100 c. c. of a three-fourths of one per cent. solution of sodium chloride saturated with calcium phosphate, adding 1 c. c. of a two per cent. solution of potassium chloride.

A solution, which is somewhat more complex than the above is Billroth's. It is used quite extensively in the Bellevue Hospital and consists of

℞ Sodium phosphate gr. iii, sodium carbonate and ammonium carbonate āā gr. xx., sodium chloride gr. lx., alcohol m. clx., Aq. destil, ad. ʒ$\overline{xx}$. These have a more stimulating action on the heart than the simple solution. The latter has the advantage, however, of being easily made, and its ingredients are always at hand. For practical purposes the simple solution is made by adding one teaspoonful of salt to a pint of water.

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Physiological Action. Injections of a solution of salt of a strength of five to seven grammes per litre are followed by a definite (3) series of symptoms. The respirations become slower and the pulse increased in frequency. In collapse, however, injections are followed by a diminished frequency and increase in volume of the pulse. In from twenty to thirty minutes after the injection the patient seems to have an attack of ague. There is a chill and rigor which vary in intensity, sometimes being so mild as to escape observation and again their intensity may be such as to suggest the onset of pneumonia. The pulse during this crisis becomes more frequent and small and the temperature becomes elevated and may reach 104° or 105° F., returning to normal in the course of a few hours. The salivary secretion is increased. The skin becomes moist and the urine more abundant. For a few hours subsequent to the injection there may be a slight diarrhœa probably due to increased intestinal secretion. The specific gravity of the blood, which in conditions of collapse, is raised (4) falls after saline injection.

Therapeutics. Collapse, during or after operation, is the condition which most frequently calls for the exhibition of the saline solution. In patients whose vitality has been lowered by prolonged illness and confinement in bed, or in those suffering from shock, injections of saline solution will frequently stimulate them sufficiently to carry them through an operation which would otherwise be fatal. In this connection I will quote from a letter from my friend Dr. R. W. Baird, one of the house physicians at Bellevue Hospital:

"In answer to your inquiry in regard to the use of the saline solution in our gynecological service, will say that we think a great deal of it and use it in almost every major operation, either before, during or after. In those cases in which we expect to have profuse hæmorrhage and in case of malignant disease or in any pelvic trouble where there is emaciation or a weak pulse, we give from twelve to sixteen ounces of saline solution (usually Billroth's solution) subcutaneously or sixteen ounces of ordinary saline solution per rectum between the beginning of the anæsthetic and the mak-

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ing of the incision. Patients thus treated seem to stand the shock of the operation better and the pulse remains fuller and slower during the operation than otherwise." After laparotomy thirst is very apt to be a most disagreeable symptom, particularly when complicated by nausea. A rectal injection of a pint or a pint and a half of simple saline solution not only relieves the thirst but also stimulates the secretion of urine.

Collapse following profuse hæmorrhage, as in placenta prævia, gastric ulcer or from the intestinal ulceration of typhoid, is another indication for its use. Cholmogroff (5) from a study of fifty-one cases of hæmorrhage during or after childbirth concludes that the saline solution is at once a harmless and most valuable means of combatting severe hæmorrhage.

In the collapse stage of cholera its use has given encouraging results. Excellent results have been obtained by its use in the diarrhœa of children. Picot (6) reports the case of an infant two and one-half months old suffering from collapse secondary to an acute gastro-enteritis, in which subcutaneous injections were followed by recovery. At the time of the first injection the case appeared to be hopeless.

Bollinger (7) from a study of the cause of death in pneumonia believes that heart failure in this disease is secondary to an oligæmia produced by the exudate of serum into the lung. On this ground he suggests saline infusion as a rational treatment. A number of successful cases treated by this method have been reported.

Very encouraging results have been obtained from its use in septicæmia. Dr. H. M. Silver, in a personal communication, gave me the history of a case of puerperal infection which recently came under his observation, in which in spite of all his efforts "things went from bad to worse." Finally, following Clark (8) he gave submammary injections of saline solution. Improvement was immediately noticeable; the case going on to ultimate recovery.

In uræmia and eclampsia large saline injections act by diluting the poisons in the circulation and causing their elimination by promoting diuresis. Where there is high arterial tension,

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abstraction of ten to fifteen ounces of blood should be done before administering the saline fluid. Such was my procedure in a case of uræmia which was admitted into one of Dr. A. A. Smith's wards in the Bellevue Hospital. It is with his kind permission that I report this and a case of partial asphyxia by inhalation of illuminating gas. The patient, male, about fifty-five years of age, was in profound coma; respirations were of the Cheyne Stokes type, and pulse of high tension. There was also general anasarca. By catheter a few ounces of bloody urine were withdrawn. It was found of a specific gravity of 1018, containing albumen, granular, epithelial and blood casts. I abstracted one pint of blood from his forearm and a pint of simple saline solution was thrown high up into the rectum. I saw the patient four hours after the operation. I was surprised not only to find him still alive but completely conscious and rational. He was very pale; pulse was soft and respirations were normal in frequency and rhythm. He remained in this condition for two or three days, then he gradually sank into a typhoid state and died fifteen days after the operation. I believe life was prolonged in this case for two weeks.

Believing that diabetic coma is an "acid intoxication," Stadleman (9) has suggested the use of an alkaline salt solution by intravenous injection as a rational mode of combatting this complication. The most that can be said in its favor is that it will temporarily restore the patient to consciousness. At times this may be very desirable.

In poisoning by illuminating gas, saline infusion has been used with success. In such a case which came under my observation at the Bellevue Hospital, I abstracted about ten ounces of blood and injected subcutaneously about the same volume of simple salt solution. The patient, who at the beginning of the operation was profoundly comatose, with loss of corneal reflex, sighing respirations and rapid feeble pulse, rapidly regained consciousness with coincident improvement in her general condition.

Cases of morphia poisoning successfutly treated by saline infusion have been recorded. Temporary improvement has

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followed its exhibition in pernicious anaemia. In purpura more favorable results have been obtained. Pigot (10) reports a case in which in spite of iron, ergotin and lemon juice, no improvement followed. "Finally, 250 c. c. of artificial serum was injected subcutaneously and within twenty-four hours marked improvement had taken place. A second and a third injection of the same amount of fluid were given on successive days and within forty-eight hours convalescence set in and progressed to ultimate recovery."

Methods of Administration. The solution may be administered by injections directly into the circulation, subcutaneously or by rectum. In extreme cases of shock or collapse or where a very prompt action is desired intra vascular injection is the method to be preferred. Kelly (11) has practiced intra-radial injections. In a number of cases this was followed by gangrene of the hand and he himself has abandoned this method. Dawbarn (12) injects directly into the common femoral artery. This procedure however, has not become very popular.

When injection directly into the circulation is desired the intravenous method is the one most commonly selected. It is simple, safe and rapid.

Subcutaneous injections are as efficient as intravenous injections, but are somewhat slower in their action, and in cases of circulatory failure absorption may be delayed or not take place at all.

High rectal injections act well in most cases but should not be used where the circulation is feeble or where prompt action is desired.

Technique. The apparatus required is very simple and should always be at hand ready for emergencies. Many surgeons and obstetricians regard it as a very essential part of their armamentarium and do not attend any operation or case of labor without having it ready at hand. The apparatus I have frequently used consists of a fountain syringe to which a blunt canula is attached or, in case of subcutaneous injection, a sharp aspirating needle. For rectal injections a long rubber tube takes the place of the needle. The amount of pressure may readily be regulated by raising or lowering the rubber bag.

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A Davidson syringe answers equally well. The antitoxin syringe answers very well for subcutaneous injection, especially in children.

The temperature of the solution should be about 100°–105° F. In cases of collapse the solution may be made more stimulating by raising its temperature to 110° or 115° or even 120° F. (12.)

The amount of the solution for intra-venous or subcutaneous injection need not exceed 1000 to 1500 c. c. at one injection. The pulse should be carefully watched and when it becomes of fair volume the injection should be discontinued, to be repeated if the case demands it. Rectal injection should not exceed one pint at a time. Large rectal injections are not as readily absorbed and are apt to be rejected.

The technique of intravenous injection is very simple though the operation is at times difficult on account of the collapsed state of the veins.

The internal saphenous above the ankle or as is more commonly done the median cephalic or cephalic vein is selected for the injection. An incision somewhat oblique to the course of the vein is made and the vein dissected out for about one inch of its course. A ligature is then passed around the distal end of the vein and tied, another is passed around the proximal end and allowed to remain untied. The vein is now incised between the two ligatures and the canula introduced. The proximal ligature is now tied lightly so as to retain the canula in place. The apparatus and solution should be sterile. All air is expelled from the apparatus by allowing the solution to flow through. The rubber tube is then pinched and canula inserted into the vein as already indicated. The time required for infusing 1000 c. c. should not be less than ten to fifteen minutes. When enough has been injected the rubber tube may be clamped and the canula allowed to remain in situ so that should further injection be required everything is in readiness. Finally the canula is withdrawn, the ligature is tightly tied and the wound dressed aseptically, one or two skin sutures being put in.

The subcutaneous infusion may be given into loose cellular

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tissue in any situation. Infusions have been given into the submammary connective tissue, and Morse, of Norwich, England, has suggested and practices injection into the axilla. The abdominal walls and thighs are commonly selected. The needle should be thrust well into the cellular tissue and slowly withdrawn as the solution flows in. About the point of the needle there forms a tumor which should be gently massaged so as to aid in its diffusion.

In giving the rectal injection the tube is passed high up and the solution allowed to flow in slowly.

An excellent procedure after laparotomy is to fill the peritoneal cavity with a warm saline solution before sewing up the wound. It acts here not only as a stimulant but also tends to prevent the formation of adhesions.

Conclusion. In conclusion I wish to point out that while the use of the salt solution has been confined mainly to surgical practice, its value in conditions not purely surgical, such as post-partum haemorrhage, puerperal septicaemia, uraemia and diarrhoea, should commend it to both the accoucheur and physician.

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DISCUSSION.

DR. H. DIEFENDERFER.—Sterilized milk is sometimes used instead of human blood or salt solution, with apparently as good result. Cold salt solution used in an experiment on a dog in which hemorrhage had been induced, seemed to act as happily as the warmer solution, say 109° F.

The absolute life saving value of the salt solution is still uncertain. In many cases the effect seems but temporary.

It would seem, however, to be a good therapeutic agent.

DR. GUTHRIE.—I feel like expressing my appreciation of the essay read this evening, and of the work spent on it by Dr. Goldberger, who is not as yet a member of our Society. This latter fact is neither his fault nor ours as the constitutional limit of time required in the county for membership in our Society has not yet expired. My experience with the use of saline solution is limited. I have used it subcutaneously but never intravenously. The cases in which I used it proved fatal, not however, from the salt solution but in spite of it. The method of using it in my cases was with glass funnel, with tube and long needle attached, which idea I got from Mulford's laboratory, having there seen the same method used in injecting antitoxin serum in horses.

DR. W. S. STEWART.—I have had some experience with saline solutions, especially in obstetric practice.

I was called in consultation some time since in a case of placenta previa, but the hemorrhage had stopped before my arrival and the woman was left in fair condition.

In about a week or ten days after, I was again called to see the same patient, and found her in very low condition with a temperature of 108°. Ice packs were used, the womb curretted and normal salt solution used. Also Edson's Aseptolin. The next day the solutions were again used, and the patient recovered. This was the sickest women from sepsis and high temperature that I ever saw get well, and I believe her recovery was due to the saline injections.

In abdominal work I have had two cases of secondary hemorrage in which the saline solution was used after securing the bleeding vessels. Both patients were in collapse and death imminent but both recovered. I recently operated on a patient whom I found in state of collapse shortly after the operation. I used an intra-venous injection but the patient did not rally. I am strongly in favor of saline solutions as a therapeutic remedy.

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DR. YOUNG, Nanticoke, Pa.—In a case of a young man, aged twenty-five years, operated on for an osteoma of the Basilar process of the sphenoid bone, the inferior maxilla of one side being removed to allow of access, the patient collapsed twice in succession; after the second collapse, normal saline solution was infused, a quart at a time at intervals of perhaps forty-five minutes for three quarts. There being no pulse at the time of infusion, at femorals or other points.

The infusion caused a decided rally, the patient twice recovering so as to seem to have knowledge of his surroundings and attempt to speak, the latter only partially successful.

It suggested itself during the three hours that the man lived, that in any diffuse area, which can not be perfectly reached there is danger of starting a hemorrhage, imperfectly stopped—whether due to increase of pressure or to dilution of the fibrin-carrying elements is out of my knowledge.

DR. J. T. HOWELL.—The saline treatment was successfully used in the following cases which I desire to report:

Case I. Dennis O' Shea, Aet. 17, admitted to Wilkes-Barre City Hospital, Nov. 5, 1896, for gunshot wound of the abdomen. This boy did fairly well under symptomatic treatment until Nov. 19, when he developed slight peritonitis, passed bloody urine and showed a general septic condition. At a staff consultation it was decided to perform nephrotomy. The kidney was found in a normal condition. To relieve the peritonitis the abdomen was opened, the intestines and abdominal cavity well washed with normal salt solution and about a quart of the solution poured into the abdominal cavity. The wound was dressed in the ordinary manner with drainage. The boy made an uneventful recovery and was discharged cured, Dec. 11, 1896. Time in the hospital, thirty-five days.

Case II. Joe Yoziak, Aet. 14, admitted to the hospital, Nov. 18, 1897, with a crushed left leg, and a compound fracture of the right leg.

This boy was injured at 12:30 P. M., and was brought to the hospital at eight o'clock in the evening. The parents were much opposed to amputation and it was several hours before their consent could be obtained. From loss of blood and shock the boy was almost pulseless. After amputation of the left leg, which was done very rapidly, and the patient not responding to hypodermics of strychnia and nitro-glycerine, about one and a half pints of normal saline solution were injected into the vein of the arm. The acceleration of the

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pulse was very soon perceptible. The patient made a good recovery.

Dr. Goldberger, in closing, said: As Dr. Diefenderfer remarks milk has been used for injection; cases have however, been reported where pulmonary embolism and death has resulted from it. Defibrinated blood has the same objections. It is impossible to remove all particles of fibrine from the blood and consequently there is the danger of embolism.

It is hardly necessary to remark that in cases of hemorrhage the bleeding must be stopped before we can expect any results from the injection.

PATHOLOGY OF OVARIAN CYSTS.

BY DR. WALTER DAVIS, WILKES-BARRE, PA.,
READ FEBRUARY 16, 1898.

Mr. President and Gentlemen:

I have attempted, by way of review of a familiar subject, to bring out the facts, obtained from various books and the clinics of Dr. Penrose, regarding the pathology of the various cysts of the ovary and broad ligament. The works of Waldeyer, Rokitanski, Oldhausen and other writers of two or three decades ago, regarding the histogenesis of these tumors, has been little advanced by later writers; but Bland Sutton, Pozzi, Penrose, Coe and other living authors have given a clearer definition to the pathological peculiarities of the different cysts, which bear upon their clinical aspects and hence interest the practical physician.

The cyst bearing area of this region consists of three parts: first, the Oöporon or egg bearing portion of the ovary which contains the Graafian follicles; second, the Paroöporon or hilum of the organ which contains the presistent remnants of the Wolfian body, and third, the Epoöphoron or Parovarium; a series of tubules analogous to the vasa efferentia and epidymus of the testicle, lying between the layers of the mesosalpinx.

Follicular, glandular and dermoid cysts arise from the Oöphoron.

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When anything prevents the rupture of a mature gaarfian follicle, causing a retention of its secretion, a follicular cyst results. Inflammation, extending to the covering of the ovary, from an inflamed tube, is the most common cause. The discovery of ova in these cysts by Rokitanski first difinitely established their origin from the graafian follicle.

Unlike the glandular oöphoritic cysts, they are limited in growth, rarely becoming larger than the adult fist. One graafian follicle may be affected, causing a cyst the size of a hen's egg projecting from the surface, or many follicles may be involved causing what is called cystic degeneration of the ovary. The disease usually affects both ovaries.

A special variety of follicular cyst may arise from a ruptured graafian follicle or corpus luteum. It is very rare in woman though common in the lower animals. It is distinguished by its yellow covering and certain bud like papillae upon its interior. · Follicular cysts are thin walled; their smooth lining is composed of a layer of columnar epithelium derived from the membrana granulosa. Their contents are clear, unless hemorrhage has occurred, and of a specific gravity from 1005 to 1020.

GLANDULAR CYSTS.

The most common of all ovarian tumors is the glandular or multilocular cyst of the oöphoron. They constituted about 75 % of Penrose's cases, and Peasley states that 95 % of all ovarian tumors are of this variety. Of 605 laparotomies for all purposes seen by Doran, 366 were for these growths.

The view of Spencer Wells and others that the glandular cyst, like the follicular cyst, arises from the mature graafian follicle has been discarded. They never contain ova, and differ from the follicular cyst in size, manner of growth and other features.

Pathologists are now pretty well agreed with Waldeyer's view, that they arise from the tubes of Flüger. These are epithelial tubules formed early in foetal life by invaginations of the germinal epithelium into the ovarian cortex. Later these tubes usually develop into graafian follicles but they some-

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times persist unchanged after birth, and may then give origin to the glandular cyst.

The shape of this cyst is generally spherical with lobulations due to the presence of secondary cysts in the interior. The lobulated parts feel solid, while the large cavity which presents in the wound is tense and fluctuating.

The glandular cyst attains the greatest size of any ovarian growth. It is only limited by the vitality of the patient and the distensibility of her abdominal walls.

Kimball, in attempting the removal of a large specimen, after drawing off 160 lbs. of fluid was forced to abandon the operation, though more than 20 lbs. remained.

Reifsnyder described a native Chinese woman four feet eight inches in height, with a tumor which, after growing six years, measured five feet nine and one half inches in circumference and weighed 182½ lbs. after removal. A cyst weighing ninety pounds has been removed in this city. The amount of fluid removed in some cases by tapping is interesting. Nine thousand eight hundred and sixty-seven pounds by 299 tappings in eight years and 6631 pints or thirteen hogsheads by eighty tappings in twenty-five years are two goods specimens. Sir Astley Cooper reported a case in which a woman was tapped 665 times in thirteen years—an average of once in seven days.

The outer surface of the glandular cyst is of a smooth glistening, silvery appearance. The color varies to some extent, depending upon the thickness of the wall, the color of the contents and the inflammatory and degenerative changes in the wall. Doran says the more white and glistening it is the better for both the patient and operator. It is covered by a layer of endothelium which is intimately connected with the wall and cannot be stripped off. Adhesions do not form with neighboring parts until by friction the integrity of some portion of the endothelium is destroyed.

The wall of the glandular cyst is composed of fibrous tissue containing unstripped muscular fibres. It is thickest near the pedicle where two fibrous and one muscular layer can be made out. In the oldest part of the wall opposite the pedicle, the muscular layer disappears and only a thin fibrous structure re-

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mains. The walls may undergo certain changes. Partial calcification by the deposit of lime salts is common. Fatty degeneration, hemorrhagic infarction and inflammation also occur. Blood vessels and lymphatics of large size occur in the cyst wall. They are largest and most abundant near the attachment of the pedicle. Here veins as large as the femoral have been seen.

The internal structure of the glandular cyst presents various degrees of complexity. At first they are always multilocular. As the cyst grows older atrophy of the septa between a number of adjacent loculi usually occurs, resulting in the formation of a chief cyst cavity which is surrounded by others of smaller size. The cyst has then a tendency to become unilocular with age; but the remains of the septa can be found in the walls of even the largest cavities. The whole interior is lined with a smooth layer of columnar epithelium which dips down at various places to form complex mucous glands. When these become obstructed secondary mucous retention cysts are formed in the interior of the parent cyst. By a repetition of this process a tumor the size of the pregnant uterus may be formed in which there is no cyst larger than a good-sized plum, and giving the honey-comb appearance on section.

Still another kind of secondary cyst may be formed on the outer surface, by the retention of secretion in a graafian follicle representing the remains of the ovarian cortex stretched out on the cyst wall.

The growth of the glandular cyst usually destroys all traces of the true ovarian tissue, but the fact that a corpus luteum may be found explains the remarkable cases described by Atlee and others in which pregnancy has occurred although both ovaries were grossly diseased. One of the loculi of a glandular cyst may have all the characteristics of a dermoid. This is due to the fusion of a multilocular and a dermoid occurring in the same organ.

CONTENTS.

The specific gravity of the contents of a glandular cyst is always above 1010. The consistency and color vary greatly not only in different tumors but also in different loculi of the

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same tumor. As a rule the fluid of the largest and oldest cavities is lighter in color and thinner in consistency than that found in the smaller and more recently formed divisions. For example, the main cavity in a case removed recently at the hospital contained a fluid light green in color and thin enough to run easily through the canula, while the secondary cysts contained a thick starchy, whitish material. In short, the color has the widest variation from white to black, while the consistency varies from watery to jelly-like. The chemical and microscopical composition of the fluid is not as important as it was when exploratory punctures were more frequent. The ovarian cell of Drysdale is found in other fluids which contain cells undergoing fatty degeneration, and the absence of the cell is no sign that the fluid is not ovarian.

The fluid has no constant chemical peculiarity. Glandular cysts grow into the general peritoneal cavity. They do not push aside the layers of the mesosalpinx as do the parovarian and paroöphoritic cysts. In other words they are intraperitoneal not intraligamentous. Hence they have no covering of peritoneum and the Fallopian tube is not distorted by their growth. The pedicle of the cyst is composed of the structures between the ovary and the uterus; namely, the Fallopian tube, the ovarian ligament and the upper part of the broad ligament. It varies in thickness and in the size of the vessels which it contains. The main vessel is rarely larger than the radial artery. The arteries are the ovarian and branches of the uterine. Glandular cysts are usually unilateral. They occur on both sides in only four per cent. of cases. When they do, two pedicles are found and the bodies of the cysts may be pressed together and even become a single tumor.

Dermoid cysts of the oöphoron constitute about four per cent. of ovarian tumors. They vary in size from a hen's egg to an adult head. In eighty per cent. of cases they are unilateral. Their external surface is of a dull or yellowish brown color, differing markedly from the glistening appearance of the glandular cyst. They give a putty-like sensation to the finger. Dermoids are characterized by the fact that their internal surface is partly or wholly lined with skin.

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Cutaneous appendages: hair, sebaceous glands, sweat glands, horn, and nails are found, and in addition structures derived partly from the mesoblast and partly from the epiblast, occur, such as teeth, mammae, unstripped muscle and tissue resembling brain matter. In rare cases organized structures like fingers have been found. The hair may be short or long. Its color has no correspondence with that upon the external surface of the individual. It becomes white with age. Teeth are found free in the cavity, attached to bone or imbedded directly in the cyst wall. They may or may not be well formed. The usual number is ten or less, but as high as 300 have occurred. The mammae may have nipples and glandular tissue. Secondary cysts may form in the interior by the blocking up of the sebaceous and sweat glands which are so numerous.

Dermoids are usually intraperitoneal in growth, like glandular cysts, but in some cases they develop between the layers of the broad ligament and may assume any of the positions characteristic of extraperitoneal cysts. The ovarian dermoid is very often inflamed. The adhesions may be few in number or it may be universally adherent and therefore difficult or impossible of removal. It may become infected from the intestine, bladder, Fallopian tubes or vermifom appendix.

In case a cyst is severed from its attachments by twisting of the pedicle it may be well nourished through the adhesions. This twisting of the pedicle and transplantation of the cyst is commonest in dermoids. After adhesions have formed the contents of a dermoid may be discharged through the bladder, vagina, intestine or abdominal walls. A tooth from a dermoid discharged into the bladder has formed the nucleus for a calculus. The rupture of a dermoid into the peritoneal cavity, either spontaneously or during operation, is dangerous, and fatal peritonitis may result.

An interesting cyst develops in the Paroöphoron. Waldeyer showed that the distal ends of the vertical tubules of the Paroövarium regularly enter the Paroöphoron. After this, Oldhausen suggested that the papillomatous cyst starts from these distal ends, which are the remains of the Wolfian body in the ovary. His reasons for this view were the occurrance

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of cylindrical epithelium in their interior, and the frequency of their intraligamentous position. His view of their origin is now accepted by the majority of American and English authors. Some, however, believe that the only difference between the glandular and the Papillomatous varieties is, that in the former there is a proliferation of the glandular elements, and in the latter a proliferation of connective tissue. Papillomatous cysts are not very common. Shrœder found fifty cases in five hundred ovariotomies. Penrose found even a larger proportion.

The wall of a papillomatous cyst is composed of a dense outer and a loose inner layer of connective tissue. When it is intraligamentous, separating the folds of the broad ligament, it has in addition a covering of peritoneum which can be stripped off. A single layer of columnar epithelium covers the internal walls and the papillomata. The warts or papillary growths which vary considerably in size, may be scattered over the whole inner cyst wall or collected in groups forming arborescent cauliflower-like masses. They may be sessile or pedunculated. They consist of a connective tissue stroma, often richly cellular, which is dense near the attachment to the cyst wall, and looser in the free extremity. It affords support to blood vessels of considerable size, branches of which enter each component papillary process and terminate in a single loop or fine capillary net work. Hemorrhage is easily excited unless calcifaction of the papillomata takes place.

Tait says there are two forms of papillomata, one malignant and one not so. The latter speedily disappears after the removal of the tumor and the patient gets well, though its naked eye appearances are quite indistinguishable from those of the malignant kind. The distinction is based on clinical rather than pathological facts. Bacteriology may throw light upon the differences in the infecting powers of the various ovarian fluids. Dr. Welsh has established the cause of the rare cases in which the cyst contains air and gives a tympanitic note on percussion, and there is room for more work in the same direction.

Pappillomatous cysts are smaller in size and of slower

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growth than the glandular cysts. The warty growths are apt to perforate the wall and infect the peritoneum before the cyst has attained the size of the adult head. Coe says that metastasis with infection of distant parts may take place through the blood vessels and lymphatics without rupture of the wall, and instances a case in which the warts were found in the lung. Usually the growths make their way to the outer surface of the cysts and extend thence throughout the peritoneum; or rupture takes place and portions of the warts broken off in the cyst fluid are carried rapidly to different parts of the abdominal cavity where they become implanted and grow. Any of the viscera may be the seat of their growth. Sometimes they perforate the wall of the uterus, rectum or bladder and protrude into the cavities of these organs as cauliflower masses. Infection of the peritoneum is associated with ascites. Sometimes cauliflower masses growing upon it may be large enough to be palpated through the abdominal wall. The tendency to rupture with subsequent infection of the peritoneum makes this paroöphoritic cyst the most dangerous form that occurs in the ovary.

Papillary cysts are usually unilocular and are more often bilateral than any other cyst. I have seen a wart no larger than the little finger nail, which only a special examination of the second ovary would have discovered. The fluid contents of these cysts is usually clear and of a watery consistency, the specific gravity varying from 1005 to 1030. The last part of the fluid removed by tapping may be bloody. This may be the first fact which leads to the diagnosis of the variety of cyst with which the operator is dealing. The situation of the growth is a matter of great practical importance. The papillomatous cyst is usually intraligamentous, or extra peritoneal, but it may be intraperitoneal. Intraligamentous tumors first separate the layers of the broad ligament. Their covering of peritoneum may merge into that of the Iliac fossa and the fundus uteri, without sensible depression. The uterus is forced to the opposite side of the pelvis and elevated. The folds of peritoneum may be separated in various directions. They may grow altogether behind this membrane, coming

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into immediate relationship with the rectum, or they may pass behind the cæcum and ascending colon, growing between the layers of the meso colon. They sometimes develop more especially under the anterior layer of the broad ligament, strip off the peritoneal covering of the bladder and come into immediate relationship with the anterior abdominal wall; so that if laparotomy is performed the operator will enter the cavity of the cyst before he has opened the peritoneum. The most important pressure effect of these cysts is upon the ureters, causing hydronephrosis and kidney degeneration. Kidney disease was present in thirty-two out of forty autopsies reported by Doran.

I shall say just a word about the only cyst of the parovarium of any importance, because it is not clinically distinguishable from ovarion cysts. It arises from the distention of the verticle or longitudinal tubules. The cyst walls are very thin, hence they are liable to rupture. Goodell called them bursting cysts of the abdomen. Fine vessels can be seen ramifying over the surface. This is covered by a layer of peritoneum which can readily be stripped off. Their contents is a clear, limpid fluid of a specific gravity below 1010. When they rupture, this is readily absorbed and does not infect the peritoneum. They sometimes contain several quarts of fluid but their size is usually less than a child's head. They rarely consist of more than one cavity and occur only on one side. They are less common than either oöphoritic or paroöphoritic cysts. They constituted 11% of Oldhausen's cases. Their growth is slow. They develop between the layers of the mesosalpinx and broad ligament. As they separate these layers they soon come into contact with the Fallopian tube which becomes stretched out across the surface of the cyst and very much elongated. It may reach a length of fifteen to twenty inches. The ovary is not affected by the Parovarium cyst unless it is of very large size.

In conclusion, a resume of the pathological differences between the three large cysts of the oöphoron, the paroöphoron and parovarium may be in order.

The glandular oöphoritic cyst is intraperitoneal in develop-

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ment and has no peritoneal covering. The paroöphoritic is usually, and the Parovarian always, intraligamentous with detachable peritoneal investment. The ovary is destroyed early by the glandular cyst, late by paroöphoritic and never by the Parovarian cysts. The Oöphoritic is multilocular. Paroöphoritic and Parovarian unilocular. Oöphoritic and Parovarian are usually unilateral. Paroöphoritic nearly always bilateral. Oöphoritic have thick, colored contents, with specific gravity above 1010. Parophoritic contents are less thick and sometimes bloody. The Parovarian cyst has spring water contents. Specific gravity below 1005. The Oöphoritic cyst is most rapid in growth and largest in size. The Paroöphoritic contains papillomata. The Parovarian stretches and distorts the Fallopian tube.

INTESTINAL OBSTRUCTIONS.

BY DR. B. J. WETHERBY, WILKES-BARRE, PA.

READ MARCH 3, 1898.

The term, "Intestinal Obstruction," covers a wide field and a variety of conditions, each generally having its own distinct cause. Each case is an individual one, and must be studied by itself. There may be different symptoms in different cases varying with the cause, and the actual condition of the bowel; but one symptom is common to all, namely, more or less complete constipation. The term, "Intestinal Obstruction," includes all cases in which this symptom is present.

Other symptoms than complete constipation are, vomiting, which may become stercoraceous after the second or third day—a symptom pathognomonic, almost, of this condition—cold extremities and pinched nose, with sunken eyes and face bathed with cold perspiration, indicating approaching collapse; a rapid, feeble pulse which may be irregular or may be imperceptible at the wrist for several hours before death; great thirst; restlessness and a sense of impending dissolution; pain, localized or diffused over the entire abdomen. The pain var-

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ies from almost unbearable agony to only a sense of discomfort or uneasiness. It is not a reliable symptom. Its seat, if it is localized, may be no guide to the location of the lesion. In most cases the pain is referred to the region of the umbilicus, probably because the solar plexus is situated a little above this point. The pain may entirely leave the patient, and the patient and friends be deceived into believing he is better, when, in fact, he is much worse—perhaps hopelessly so. A sudden cessation of, or insensibility to, pain may mean gangrene or collapse. Pressure may relieve the pain before inflammation sets in. General abdominal pain with tenderness on pressure indicates peritonitis. A sudden paroxysm of pain followed by collapse, in a patient suffering from obstructed bowel, means perforation of the intestine with leakage into the peritoneal cavity of feces and gas. However, early collapse often takes place without perforation.

The temperature is another unreliable symptom. Sometimes it is elevated several degrees; often it is normal; more often it is subnormal. In fact, collapse is the most frequent road to death. The pulse, together with the general appearance of the patient, is our surest guide. In unfavorable cases the pulse will range from 130 or 140 to 200 and be so weak as to be almost imperceptible, while, at the same time, the temperature may be 96° or 97°.

The diagnosis of the actual conditions present is often exceedingly difficult, hence no pains should be spared in making the most careful examination possible. Inquire minutely into the history. Often it will make the diagnosis perfectly plain, as in one of my cases where a man had eaten a large quantity of blackberries, the seeds of which had formed a mass in the rectum which completely occluded the bowel and which he could not pass. Breaking down the mass with the finger together with irrigation, removed the mass and proved the diagnosis. A bowel may become strangulated by bands of adhesions months or years after an injury, operation, or an attack of peritonitis. A history of the occurrence of one of these, even years before may put us on the right track. The history of intestinal ulceration may cause us to suspect steno-

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sis from the contraction of cicatricial tissue. Sudden severe symptoms following violent muscular effort suggests hernia. Often, however, the history does not aid us. Again, it may mislead us. A bowel may have become strangulated months or even years after the operation or peritonitis which resulted in bands of adhesions having been formed. The history of such injury, operation or peritonitis may suggest the true condition present. On the contrary we must not jump at our diagnosis, since the above mentioned conditions may have no relation to a present obstruction.

The abdomen must be carefully examined. A hernia may thus be disclosed, or a tumor, the character and location of which, together with the history and subjective symptoms will often enable us to make a tolerably positive diagnosis. Too often, however, we are obliged to make an exploratory incision if we would have our diagnosis amount to more than a guess. As Robert T. Morris says, "one look is better than two feels or four guesses." When he makes the incision, the surgeon must be prepared to meet any emergency promptly, for his patient will not be in a condition to stand prolonged anæsthesia or slow surgery. He may have to resect a portion of the bowel, make an artificial anus, or do an intestinal anastamosis.

I am sure that, in the early years of my practice, I allowed several patients to die who might have been saved, had an early exploratory incision been made and the proper measures been instituted to relieve the conditions disclosed. To illustrate this point I will cite a few cases:

Case I. A healthy girl, aged twelve years, had eaten a large number of small, inferior peaches, not stopping to peel them, two days before I was called. I found her bordering on collapse, cold to the knees and elbows, pulse rapid and almost imperceptible at the wrist, frequent stercoraceous vomiting, brown tongue and great restlessness. Her bowels had not moved for two days. Abdomen somewhat distended and painless, with a tumor not very clearly defined in the right iliac region. Gave high irrigations and stimulants all night without effect and she died in collapse next day. No autopsy allowed.

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CASE II. A healthy boy of five years went out into his father's vineyard and ate an unknown quantity of immature grapes, swallowing both skins and seeds. Four days afterward I was called. His bowels had not moved since he ate the grapes. Examination was negative. Gave stimulants and high irrigation during several hours and obtained about half a tablespoonful of grapeseeds. He died next day in collapse. No autopsy.

CASE III. A lady, aged about seventy years, previously very healthy, had complete obstipation following what she thought was diarrhœa. When I was called she had fecal vomiting, some abdominal pain and distention, dry, brown tongue, great thirst, and restlessness. Being rather stout, physical examination was negative. Believing this to be a case of fecal impaction of long standing, in which the apparent diarrhœa had been due to a channel through or around the fecal mass, together with an irritation of the bowel caused by the mass, I spent almost the entire night in administering high irrigations, but with no success. The patient died about thirty hours later in collapse.

I have given these histories from memory, and as they occurred more than ten years ago, the history is necessarily incomplete. If an early exploratory incision is made in this class of cases, we generally find a condition that can be removed and the patient's life saved.

One of the first things to look for on going to a case of intestinal obstruction is hernia. This is a very frequent cause of ileus, and may be present even though the hernia cannot be demonstrated externally, as is illustrated by the following case:

A laborer, aged about fifty years, sent for me at eleven o'clock P. M., to relieve him of a severe attack of abdominal pain associated with persistent vomiting. He had worked all day and felt well until a short time after supper, when he was suddenly seized with severe griping pain and vomiting. History and examination both negative. A hypodermic of morphia and atropia relieved both the pain and vomiting. Ordered a large saline cathartic. Next day pain and vomiting returned and the bowels did not move. Examination still negative. Ordered more salts, and relieved pain and vomiting by giving another hypodermic injection of morphia and atropia. When I saw him on the second day all the symptoms were worse,

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vomiting was becoming fecal, pulse was 140 and the temperature slightly subnormal. The bowels had not moved. That afternoon we opened his abdomen and found a knuckle of intestine strangulated in the right inner ring. It was easily pulled back and liberated, and he made a rapid and uneventful recovery.

Had no exploratory incision been made he would surely have died. Had the operation been postponed the gut would soon have become gangrenous, making a resection necessary, greatly adding to the risks. Therefore, it is well not to make the incision as a last resort, but to operate early, since the operation in itself is practically devoid of danger—always assuming, of course, that it is properly done by a competent surgeon.

Besides a hernia, partial or complete, parietal or omental, the incision may disclose a band of adhesion closing the lumen of the bowel; a tumor pressing on the bowel; a volvulus; an intussusception; a stricture due to contraction of cicatricial tissue following ulceration; or a foreign body in the intestine which sometimes is a surprise to us. Here is an illustrative case:

Mr. E., farmer, aged about forty years, resident of Hutchinson, Kansas. He had gone to his work in the morning feeling as well as usual, but was seized about noon with an excrutiating pain in the epigastric and right hypochondriac region, which compelled him to go home and go to bed. Home treatment was employed for two days, when his condition became so alarming that Dr. C. Klippel, of Hutchinson, was called, who immediately called me in consultation. We got a history of repeated attacks of what the patient called bilious colic which had extended over the past twenty years of his life. These attacks were irregular in their occurrence, were accompanied with vomiting and severe epigastric pain, and were followed by jaundice and epigastric tenderness. During the intermissions he enjoyed comparatively good health. During the present attack, before a physician had been called, the pain, vomiting, etc., had been continuous and severe. We found him suffering from intense diffuse abdominal tenderness and pain, temperature normal, pulse 140 and very feeble, obstinate vomiting, which was not stercoraceous but rather of a bilious nature, extreme prostration and complete obstipation. The abdomen was flat, dull and retracted, which, together with the

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character of the vomiting, led us to believe the obstruction, if any existed, was high up. We ordered calomel in broken doses, salines, irrigations and stimulants, but without effect. Next day his temperature was subnormal, pulse rapid and almost imperceptible, stomach intolerant and no action of the bowels. We opened his abdomen and found lodged in the upper part of the ileum an enterolith, which I now present for your examination. The bowel was clamped on each side of the stone, a longitudinal incision made through the intestine and the stone removed. The opening into the intestine was closed with Czerny-Lembert sutures, fine silk being the material used. The peritoneum was not soiled and the operation lasted less than thirty minutes; but the patient died in a few hours, never having rallied from the partial collapse from which he was suffering before the operation.

I believe an earlier operation would surely have saved his life. The stone is three and one-half by four inches in circumference and entirely occluded the lumen of the bowel. It probably originated in the gall bladder and in course of time ulcerated through into the duodenum, from whence it passed on into the ileum where it became impacted.

A rare and peculiar form of intestinal obstruction is one in which no bowel movement can be obtained, yet there being no mechanical obstruction like a foreign body, peritonitic band, strangulation, &c. The obstruction is caused by a spasmodic contraction of the muscular fibers of the intestine, limited to some portion of the intestinal tract, functional instead of organic in character, and being probably of nervous origin. Ewald, in Vol. 9th of the Twentieth Century Practice, described this condition under the name of intero-spasm. The following case will illustrate this peculiar condition:

Mr. L., of Hutchinson, Kansas, partook of a hearty dinner Christmas, 1896. During the afternoon of the same day he ate a great many nuts, considerable popcorn, &c. During the following night he was seized with vomiting and severe abdominal pains, for which he called a physician. The pain and vomiting continued for four days, during which time the physician had been unable to secure a movement of the bowels. On the fifth day I was called in consultation. I found the patient lying on his side with his knees drawn up, and complaining of great abdominal pain, thirst, nausea, restlessness, &c. His

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pulse was rapid and weak, temperature subnormal. His belly was retracted and the abdominal muscles absolutely rigid—boardlike. Aside from this the examination told me nothing. As the case seemed urgent, we decided to prepare for operation, and when he was anesthetized, examine the abdomen again, which we accordingly did. But profound anesthesia did not relax those muscles. I made an incision between two recti muscles that were absolutely boardlike. I expected to find a foreign body the result of his Christmas dinner, but found nothing. However, the upper part of the small intestine was very much congested, being almost purple in color. About the middle of the small intestine the gut was contracted to such a degree, for several inches, that the lumen was practically obliterated. Below the contracted portion, the intestine looked perfectly normal. I did not know of anything to do but to flush the abdominal cavity with warm sterile water, close the wound and put him to bed. Stimulants, rectal injections, &c., did no good and he died inside of twenty-four hours.

Had I known what the conditions were I would not have operated, although I do not think the operation hastened his death. I have no theory regarding the cause of this rare form of ileus.

All cases of intestinal obstruction do not require surgery. Cases due to impacted feces often yield to high injections of warm water, soapsuds, a solution of epsom salts in water to which turpentine may be added in the proportion of one teaspoonful of turpentine to a quart of the solution. Pure glycerine thrown high into the rectum sometimes succeeds after other forms of injections have failed. In giving the injections always elevate the buttocks, and inject through a long rectal tube. It may be necessary to use considerable force, and sometimes it is advantageous to anesthetize the patient. Intussusception may be relieved by forcible distention of the bowel with water or gas; but do not prolong your efforts unduly, and do not make the operation a last resort so that you will be obliged to operate upon a patient who is already well down into the Valley of the Shaddow of Death as I have several times been obliged to do. Delay may make the operation simply an ante-mortem examination, while the death will very likely be, by the laity, attributed to the operation, and sur-

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gery be unjustly blamed. Remember that in acute intestinal obstruction there may be a severe peritonitis with a normal or subnormal temperature and a feeble pulse. Given the symptoms—pain, vomiting, collapse, complete constipation, and tympanites—which resist enemata, stimulants and purgatives continued for a few hours, the physician can make a positive diagnosis of some form of ileus which can be relieved only by surgical interference; and every hour of delay diminishes the chances of recovery.

Why do we always have collapse in this condition? It is always present, comes on early, and closely resembles surgical shock. It cannot be due to traumatism, since there is more trauma when an end-to-end or lateral intestinal anastamosis is made, and yet there may be little or no shock. It cannot be due to nerve compression, for in making an intestinal anastamosis with either Senn's plates or the Murphy button, a much greater pressure is exerted on the intestinal nerves, and the operation be followed by practically no shock. Again, if an enterostomy be done, the shock will pass away, at the same time the original cause of obstruction remaining the same.

I believe the collapse is due to the sudden stoppage of the fecal circulation, and the rapid absorption of a large number of the ever present bacteria or their ptomaines. Being suddenly taken into the system nature is taken by surprise and is unable to resist them, and the nerve centers are overpowered. When they are absorbed gradually nature seems to be able to take care of them and the patient suffers in a much less degree. That it is due to the suddenness of the attack is proven by the comparatively good health enjoyed by some people whose bowels habitually move only once a week, or even less frequently.

I have said little about therapeusis in ileus, because there is little to be said. In most forms of ileus—strangulated hernia, peritonitic bands, volvulus, intussusception, pressure from tumor—purgatives can only do harm. In fecal impaction saline cathartics, and high injections are often curative; but when we remember how dfficult it often is to make a diag-

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nosis in intra-abdominal conditions in all acute and urgent cases, our resources are limited to only one procedure which holds out any definite promise of success, and that is early operation.

DISCUSSION.

DR. J. I. ROE.—Ten or fifteen years ago this disease would very properly have been considered a medical subject, but advances in our knowledge have changed the situation and it is fast passing from the realm of medicine to that of surgery.

Early diagnosis is very important. In the first place we should be sure that the case is one of obstruction. I believe many cases of appendicitis have been treated for obstruction. Hernia is likewise sometimes so mistaken, as in a case which I saw several years ago, in which the autopsy disclosed a small knuckle of gut strangulated in the internal ring.

Having eliminated every other possible condition, we should now determine the seat of the obstruction. The location of the pain is deceptive and cannot be relied upon, being often referred to a point remote from the real seat of the trouble. Examination by rectum and vagina will sometimes assist in locating the trouble, especially if in the lower bowel. High rectal irrigation will sometimes clear up the question, especially should fecal impaction be present. Distention also is an important symptom. In cases where the obstruction is in the small bowel and high up, there will be little distention. As the seat of the trouble is lower down the distention is greater. As to causes, Fitz states that seventy per cent. are due to strangulation and intussuception, fifteen per cent. to volvulus; eight per cent. to impact gall stones or fecal matter and six per cent. to stricture or tumor.

Treatment should be prompt and in all cases, except fecal impaction, exploratory operation should be done.

Nourishment administered by rectum will sustain life when vomiting is severe. Lavage is an excellent means for relieving the vomiting.

A. C. BROOKS.—One of the symptoms that may be present in intestinal obstruction is increased peristalsis which in thin subjects may be seen or felt.

While I was resident physician in the Pittston Hospital, a farmer came to the hospital in such agony that he lay down on the porch and rolled over and over. On examination a tumor was found in the transverse colon, in which increased peristalsis could be felt. The man had a history of having

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eaten, for a week back, cherries, pits and all. His bowels had not moved for two or three days. Examination by rectum negative. But high injections and calomel, ten grains, followed by salines brought away a copious discharge of cherry stones and in two days the man left the hospital.

I saw a case of congenital obstruction in a child seventy-two hours old. The mother had been attended by a midwife and the child had passed no meconium; abdomen was tympanitic and greatly distended. Rectum open as far as the finger could reach. Child's condition grave and death occurred in five hours.

I also had a case of intussusception brought to my notice by Dr. Birdsall, of Susquehanna, Pa. He reports a boy, aged eight, taken suddenly sick Sunday morning, with pain in right side of abdomen. Later in the day bowels moved, accompanied with hemorrhage. Patient continued to pass small, dark, blood stools until the following Friday. Pain in the abdomen required anodynes until Thursday the fifth day of the disease when the pain left suddenly; the pulse was fair in strength and not over 100. No tumor was present but some tympanites. On Friday Dr. Mills, of Scranton, saw the case and advised operation on Saturday, if there was no improvement, but Saturday morning bowels moved and the patient was in a better condition. On Monday he passed at stool a large mass, which, when examined, proved to be four inches of the lower part of the ilum and five inches of the ascending colon, including the appendix. The appendix was thickened and hard, which may have caused the appendix to invaginate itself in the colon and thus form the intussusception. The patient continued to improve and is in good condition.

In the Medical Record, Feb. 26, 1898, is reported a case where Mr. Frederick Treves, removed the whole of the bowel of a child, five years old, who was suffering from intestinal obstruction. He first performed laparotomy, and finding the colon greatly distended, until it looked and felt like an adult stomach, he made an artificial anus, which the child had for nine months, when he performed his more radical operation removing the entire bowel below the transverse colon, and the child made a good recovery.

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LOCAL ANESTHESIA.

BY DR. H. C. BARTON, WILKES-BARRE, PA.
READ MARCH 16, 1898.

From time immemorial it has been the pursuit of man to find means to relieve pain. Foy, of Ireland, in an exhaustive and interesting article on anesthetics tells us, through literary references, of the practice of local and general anesthesia in England in 1352. Another writer states that there is very little doubt that the Aryan surgeons used both local and general anesthesia. From thence came the tendency to use both, which is recorded in Chinese Medical literature. An English surgeon in 1784 published a tract entitled: "A Method of Preventing or Diminishing Pain in Several Operations in Surgery;" this method consists of the application of properly adjusted clamps to the principal nerve trunks supplying such parts to be operated upon. After numerous trials by surgeons of England and France, it passed into oblivion on account of its obvious disadvantages. To abolish the pain and sensibility of the skin and mucous membrane in regions where surgical operations are to be performed, and to avoid the dangers and distressing sequelæ following general anesthesia is of the utmost importance; again, a local anesthetic can be administered without the use of an assistant. This is of the utmost importance to the country practitioner who finds it difficult or impossible to procure the required number of skilled assistants to administer the anesthetic.

One of the most simple and efficient means of procuring a localized area of anesthesia is by the use of snow or ice with or without the use of sodium chloride. Through rapid evaporation we have ether, chloroform, rhigolene, carbon bisulphide, absolute alcohol, benzoyl, chloride of ethal and other allied substances, the action of which is expedited if they are applied in a fine spray. Ether, chloroform and other allied substances not only act on the peripheral nerve filaments, but also on nerve cells as well; thus Prevost found that chloroform, when applied directly to the brain of a frog nar-

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cotized it when the aorta was tied; upon removing the ligature on the aorta so that the current of blood could wash away the chloroform, the narcosis disappeared. The objections to the above agents are several, viz:

After the application has been made and the operation performed, the resulting pain is at times intense and prolonged, due to a reaction of the blood; again there is partial death of the part if frozen completely, at other times there is permanent loss of sensibility; sloughing frequently ensues and occasionally severe hemorrhage follows.

Perceirce, in 1772, introduced carbonic acid as a local anesthetic and the late Professor Dewees recommended it in carcinoma uteri, also in cancer of the intestinal canal; a still more powerful adjunct is electricity applied along the course of the nerves.

Oscar Liebrich, at a meeting of the biological society, read a paper on substances which produce local anesthesia. He states that many of them act by entering the circulation, others by their direct influence on the tissues with which they come in contact. The bromide, sulphate and hydrochlorate of ammonium produces anesthesia; the carbonate and nitrate are without effect; the salts of copper are inactive, while the salts of iron, particularly the sesquioxide, have an anesthetic action. Among organic substances, acetanilid, resorcin, antipyrine, hydroquinine and substances belonging to the digitalis group, including the venom of serpents, are active. Essential oils, such as turpentine, hydrate of terebene, eucalyptol, menthol and a number of other substances have a remarkable effect. According to Liebrich these substances act by destroying the nerve ends and produce irritation of the neighboring parts of tissues, causing what has been termed painful anesthesiæ. This anesthetic and caustic action is observed after the injection of cold distilled water.

In 1884, there was read before the convention of German Oculists, at Heidleburg, the results of Koller's, Schuff's, Moreno's and VanErp's experiments with the alkaloid cocaine. Dr. Bull, of New York, later in the same year—probably he being the first surgeon in America to use it—demonstrated its

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efficiency as a local anesthetic. The efficiency of the anesthetic agent was evident, for months after every medical and pharmaceutical journal of England and America contained some notice of it, or contribution concerning it. The use of the new agent spread to all branches of surgery. For some time previous it had been used by means of a spray and brush to pharynx, which made it tolerant to the laryngoscopic mirror, now it was found useful in operations on the throat and also aided in reducing the turgescence of the mucus membrane; it opened up a new field in opthamology and is now deemed by that branch, of priceless value. Tumors were insized and removed and more formidable operations were performed with little or no pain.

The hydrochlorate of cocaine is the salt most frequently used, as cocaine itself is soluble to only a small extent and the other preparations of this drug do not possess the same anesthetic property. If cocaine itself be dissolved in redistilled water the solution becomes turbid, which can be overcome to some degree by the addition of a small amount of glycerine or bichloride of mercury. The hydrochlorate of cocaine is very soluble and fresh solutions are quickly prepared, which should be repeatedly done, as solutions rapidly decompose. The two per cent. and four per cent. solutions are generally used. Applied to the cornea, conjunctivae, or any mucus membrane, cocaine is rapidly absorbed; the capillaries contract and the peripheral ends of nerve filaments become paralyzed. Upon the unbroken integument it has little or no effect. Injections into the tissues produce anesthesia wherever it reaches; bone, muscle and all tissue succumb to its magical effect. Applied to the eye there is said to be little or no danger of absorption of sufficient quantity to do harm. Upon the mucous membrane of the buccal cavity a four per cent. solution may be repeatedly sprayed or brushed on in the course of an operation lasting an hour, as the flow of saliva dilutes and washes away the excess of the solution (this of course should not be swallowed).

Injections into the deeper tissues below the face and neck, from twenty to thirty drops of a five per cent. solution should

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not be exceeded. The greatest caution should be exercised when injecting it within the distribution of the fifth nerve. In minor surgical operations Corning's method is to be adopted, which will give us perfect and prolonged anesthesia; this method consists in injecting the solution into the tissue, waiting from three to five minutes for its absorption by the blood vessels and the placing of a tourniquet between the point of injection and heart. An injection of eight or ten minims of a four per cent. cocaine solution will anesthatize from one to one and a half inches of tissue. In operating upon the trunk, face, head and neck under the influence of cocaine, great precaution must be taken, as its toxic effects frequently occur. The quantity of the drug in respect to its toxic effects has not been definitely determined and must vary with the susceptibility of the patient. Mild cases of cocaine poisoning are characterized by tremor, restlessness, pallor, dry mouth and weak pulse. In severe cases there is syncope or delirium. Death may arise from paralysis of heart muscle or respiratory muscles.

In the course of an important discussion on anesthetics before the Medical Society in Paris, the use of cocaine in surgery was quoted, with the result that most of the speakers had several or more grave cases to relate from its use. Broughton reports a case in which unconsciousness, irregular and slow respiration and weak pulse followed the application of five minims of a two per cent. solution to the cavity of a tooth. Myrtle dropped three minims of a five per cent. solution in the nostril of a healthy young soldier previous to the removal of a polypus, and a cold skin, weak pulse and unconsciousness followed. Germain See has collected five hundred and sixty serious cases of cocaine intoxication with twenty-one deaths. On several occasions I have seen its untoward effects; in one individual I injected twenty minims of a five per cent. solution of cocaine preceding the amputation of a finger and several minutes after the injection was made the patient's facial muscles became rigid, cyanosis appeared, the respirations became labored and irregular, and the pulse exceedingly weak.

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Cocaine has proved itself to be one of our most efficient agents in producing localized anesthesia, but it is important to remember that its poisonous effect may arise with the smallest dosage.

Chloride of ethel ranks high as a local anesthetic for operations which are limited to several minutes duration; it was formerly procured in hermetically sealed tubes, but can now be procured in glass tubes with an adjustable cap, so that the contents can be used repeatedly. The tubes with contents, should be held about two feet from point of operation; the warmth of the hand is sufficient to cause a fine spray to be ejected. The spray should be allowed to play on the tissue till a pearly white or blanched appearance ensues; incisions can then be made painlessly. The duration of its anesthetic action is from two to five minutes. I shall not attempt to extol the virtues of carbolic acid, menthol and other similar substances in the field of local anesthesia, as their action you are all familiar with.

I particularly desire to call your attention, this evening, to a local anesthetic which is receiving the highest clinical endorsements in Germany, France, England and America; I refer to Eucaine.

Eucaine Hydrochlorate is a synthetic compound. Chemically it is known as methyl-benzoyal-tetramethyl-oxypiperidine-carbonic acid-methylether. It presents the appearance of a white, odorless, crystalline powder of a slightly bitter taste, soluble in water, alcohol and chloroform. Chemical and clinical experience has demonstrated its uniform and anesthetic action. It resembles cocaine somewhat, from a chemical standpoint, but unlike that substance, does not exert the paralyzing influence on the muscles of the heart or respiration.

While acting as resident physician in the Wilkes-Barre City Hospital, during the year 1896, I procured a quantity of eucaine to be used in the outgoing surgical department, it at that time being introduced to the profession. I immediately made the following solutions of the drug, three per cent., five per cent., and ten per cent., using distilled water and boiling

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the solution. Being somewhat reluctant to use cocaine on account of the poisonous symptoms shown in the case which I related, which occurred the day before, I determined to test the reputed virtues of eucaine in the dispensary. My first experience with its action was as follows:

J. H.——, age twenty-four years, the fingers of left hand badly lacerated, exposing the bones and deeper tissues from the tips of phalanges to the metacarpo-phalangeal joints—patient suffering intense pain. I at once dropped on the little and ring fingers fifteen drops of the three per cent. solution, on the middle finger fifteen drops of the ten per cent. solution and on the index finger and thumb fifteen drops of the five per cent. solution. The agonizing appearance on his countenance gradually abated, and five minutes later I was using a stiff hand brush in removing the particles of coal and dirt which were entangled in the tissues. Upon inquiring, patient stated he felt no pain; after disinfecting wound and removing some lacerated tissue with scissors, I sutured the different fingers, using thirty-two stitches in all. Operation completed in twenty-five minutes and entirely painless. I detained patient for one hour to see if any deleterious after-effects would occur, but none arose. Primary union resulted. The same day Mrs. J. H.——presented herself suffering from a large chronic ulcer of leg. The ulcer having a diameter of several inches and extending half an inch below the surface and its surface being extremely sensitive. I saturated a piece of cotton with the five per cent. solution and applied it to the ulcer for five minutes, and after its removal I was able to curette quite freely. I then injected thirty minims at four different points and after the lapse of five minutes I again curetted using considerable pressure with curette, and also incised the edges without the least display of pain.

The following day W. H.——, aged forty years, was brought to hospital suffering from a lacerated arm, the laceration extending from the elbow to the wrist, exposing the radial artery, nerve, tendons and several inches of radius itself. The patient, reluctant when general anesthetic was proposed, I concluded to use eucaine locally. Placing patient in a recumbent position, pulse at time being eighty, respirations eighteen, I distributed two drams of a five per cent. solution into the wound. The pain at once decreasd and four minutes later he stated no pain was felt, though at this time my probe and fingers were separating the deeper tissues and muscles in search of several tendons and the radial nerve which had been incised; after dis-

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infecting wound, I succeeded in procuring the separated ends of the several tendons and nerve which I sutured, I then closed the wound, using forty-two stitches.

The above procedure was painless; after the dressing was applied his pulse was seventy-five and respirations eighteen. Primary union resulted and removed stitches in eight days. The use of the fingers were recovered by the use of massage, passive motion and electricity.

I shall not enter into more details of tabulated cases, but will state that after its introduction to the City Hospital, it had entirely replaced cocaine as the local anesthetic in the out-going surgical department. I have demonstrated its efficiency in about five hundred minor surgical operations, among them being removal of fibroid tumors, polypi, cysts, hematomaes, suturing incised and lacerated wounds, tenotomies, removal of foreign bodies, curettement of ulcers, and sinuses, in-growing toe nails, skin grafting, extraction of teeth, amputation of toes and fingers, and on five occasions the fingers were removed at the metacarpo-phalangeal joint. In all the above cases its anesthetic action was evident and absolute and the results were highly gratifying. In no case have I ever met with any unfavorable constitutional effects, though I have repeatedly used as high as four drams of a ten per cent. aqueous solution. At my suggestion one of your most esteemed and progressive dentists of this city experimented with its localized anesthetic action in the extraction of teeth. The results he attained exceeded his most sanguine expectations, so that he has discarded the use of cocaine entirely from his practice, owing to the fact that on several occasions he was compelled to adopt the most stimulating procedures to resuscitate individuals resulting from the injection of a few minims of a four per cent. cocaine solution. He informs me that in his experience of fifteen years of practice he has used no local anesthetic equal to eucaine, and where he formerly administered general anesthesia he now uses a solution of eucaine with the most gratifying results to the patient and himself. In his record of several hundred cases, he has not seen one case of abscess formation or any swelling perceptible to the eye resulting from its injection.

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In laryngology and rhinology it has received the highest endorsements; in odontology it is superior to cocaine; in the field of ophthalmology its usefulness has been demonstrated by clinical facts. When dropped into the eye it is stated to produce slight hyperemia and causes a slight irritant action for a moment.

Eucaine Hydrochlorate B, which is a later introduction, it is stated, does not produce the congestion or irritant action on the eye. In preparing solutions for surgical procedures, distilled water should be used; the solution should then be sterlized, and can be kept for an indefinite time as it does not lose its anesthetic action or decompose.

In general surgery a two to a ten per cent. aqueous solution may be employed. In subcutaneous injections a five per cent. solution is more commonly employed and of this solution ten minims to two drams will be sufficient to perform minor operations. Its anesthetic action will be observed from three to five minutes after its injection and will continue from twenty to thirty minutes.

Dr. Schleich of Berlin recommends a solution of eucaine, morphia, sodium chloride and sterilized water for infiltration anesthesia.

In conclusion I would state that clinical experience has demonstrated eucaine to be the best local anesthetic before the profession in general surgery, for the following reasons:

First. It has been proved by experiments and experience that it is seventy-five per cent. less poisonous than cocaine.

Second. Its action is rapid and safe and it produces positive and prolonged anesthesia.

Third. It can be rendered aseptic by boiling and does not decompose.

Fourth. It is less expensive than cocaine and it alone possesses antibacterial action.

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INSOMNIA.

BY DR. T. A. JAMES, ASHLEY, PA.

READ APRIL 6, 1898.

The word "Insomnia," which signifies the want of sleep, is popularly used to indicate any interference with the depth or duration of this condition, and it is in this wide sense that I shall use the word to-night. Insomnia is an evidence of vigilance in the cerebral cells and maintained by some perturbing element in the system of which it may be the sole symptom.

It is thus designed to subserve a highly conservative purpose. In some instances it attracts attention to ailments that might otherwise elude detection. While in many cases it is a necessity for the preservation of life, as in diseases of the heart and lungs, in which consciousness is required for the maintainance of respiration.

It is not a disease, but a symptom of many diseases, differing widely in their nature and complexity, as well as gravity. It is associated equally with trivial ailments and with affections which jeopardize life. Its severity and persistance is no guide to the diagnosis of the disturbance upon which it depends, for in such important lesions as organic diseases of the brain it may be absent, while it is a frequent and obstinate symptom in such prevalent affections as the functional derangement of digestion.

Again, diseases which are wont to give rise to insomnia cannot be said to do so uniformly or constantly. A disease may produce it in a pronounced form in one patient, in a modified degree in a second, not at all in a third; and it may originate in a patient at one time and not at another. The wakefulness in every case appears to be influenced and biased by the condition of the nervous system, the temperment of the patient, and by the state of general health at the time.

In many severe cases, as typhus fever, sleeplessness endangers life by increasing the enfeeblement and exhaustion at a critical juncture when a refreshing, quiet sleep would conserve the limited store of strength the patient possesses.

In cases such as these we are justified in classing sleep as a

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powerful curative agent and sufficient of itself to determine recovery. In less important disorders in which insomnia is an unyielding symptom it is not only a source of much misery and discomfort, but entails upon the sufferer a grevious hardship, in that he has to fight the battle of life in a maimed condition.

Deprived of the nightly restoration of his potential energy, his brain grows weary and his whole mental and physical vigor is impaired; and if in these circumstances he persists in striving to work, he encroaches upon his fund of reserve force to such an extent as to lead eventually to the bankruptcy of his nervous system. A man's power to work is intimately connected with his ability to sleep; and there is no more reliable indication of sound health.

Sleep has been called, " the chiefest thing in physic." As a restorative it has neither substitute or rival. It is co-equal with food and clothing for the preservation of life.

One of the great causes of insomnia is over-work—its effects are seen chiefly in the literary, scientiffc and commèrcial classes and in children.

It has often been said that " work never kills," and probably healthy and well arranged work never does.

That badly balanced, unvarying, and excessive work initiates pathological changes which in children lead to fatal terminations and in adults to disastrous consequences must be within the experience of every physician present.

There certainly can be no prolonged interference with sleep without the health being seriously compromised.

The amount of sleep an individual requires is influenced by sex, age, temperament, occupation, method of living, season and climate.

As insomnia depends on causes so numerous, so diverse, and so inconstant it is difficult to generalize or form any clear idea of its source. Every case requires to be studied carefully on its own merits—but the main lines on which the inquiry should be conducted may be briefly outlined.

The age and occupation of the patient should be noted, especial attention being paid to the habits of sleep. In obscure

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cases the nervous system should be studied in order to determine whether the excitability of the cerebral cells is dependent on inherent exhaustion or is due to impressions transmitted from different parts of the body. The state of the various reflexes and the conductivity of the nerves, especially the cranial, must be ascertained. The condition of the digestive organs and liver must be scrutinized. Careful examination of the vascular system should be made, the amount of vascular tension determined and any modification in the quantity or quality of the blood noted, such as anemia or the presence of the gouty, rheumatic or siphilitic poisons. The condition of the lungs and kidneys must not be overlooked.

Sufferers from "insomnia" from these causes may be roughly divided into two classes. (1) Those who are unable to fall asleep. (2) Those who fall asleep easily but soon awaken.

1. Those who are unable to fall asleep when they go to bed. This is usually due to activity in the brain maintained by the effects of overwork, fear, hysteria, or of tea or coffee.

In consequence of an increased blood supply arising from disturbing agencies, as cold feet, acute dyspepsia, or feverish states implying the quickening of the circulation to the extent of from eight to ten beats for every degree of increased temperature.

2. Those who fall asleep easily but whose slumbers soon terminate. They embrace two sections: those who possess impressionable cerebral cells—such cells as in hypochrondriasis, night terrors, etc.; secondly, those whose cerebral cells are rendered irritable by an impure blood supply, as in hepatic and intestinal dyspepsia—or pertains to gout, rheumatism, or syphilis—although, of course there remain many exceptions to such classification. Many devices, based upon physiological grounds, have been suggested as means of procuring sleep. The thoughts are to be concentrated by an effort of the will, preferably a monotonous one, such as in imagination singing some melody, or counting sheep marching in single file through a gate, counting numbers, or one's respirations. A physician of great determination says he is never conscious of counting more than seventeen sheep marching through a gate before he falls asleep.

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Smiles, in his work on "Life and Labor," relates that a missionary troubled with sleeplessness repeated the Lord's prayer until Satan put him to sleep to get rid of it.

In such cases I rely greatly on the Turkish bath as a curative agent relieving the cerebral congestion, toning the nervous and circulatory systems, thereby aiding digestion and assimilation. A warm bath, just before retiring, I have also found serviceable.

Bodily exercise is also a valuable curative in these cases of insomnia, attracting a large supply of blood to the muscles and skin and acting as a powerful derivative to the brain while it increases vascular tension and cardiac action. On discontinuing the exertion these states are reversed, the heart beats more quietly, the blood pressure is lowered and sleep becomes possible.

Trional and chloralose have been recommended as useful in insomnia, but my experience with trional has been that if a patient shows any signs of melancholy, trional tends to increase it. The action of chloralose is variable—by some individuals large doses are well borne, whereas in others small doses produce marked muscular symptoms and even wakfulness. Cases of wakefulness dependent on anemia and exhaustion are remarkably benefitted by phosphorus in the form of the pill or tincture. It does not procure sleep in the way that chloral and bromides do. By the use of it, in a suitable state, we supply to the cerebral substance a material which it requires for the healthy performance of its function. In a very slight degree hops first cause cerebral excitement followed by calm and a disposition to sleep. The power of a hop pillow to quiet the mind and induce sleep seems to be well established but its influence is doubtless largely due to imagination and the association of ideas. In cases of insomnia, the result of great mental strain, I have found the following prescription useful:

Sodii Bro. ʒ i.
Pepsin sacch, ʒ iv.
Lignii Carb. Pulv. ʒ iii.
Ergota Tr.
Glycerine Aa ʒ iss.
Aqua Ad ʒ iv, ʒ I T. I. D.

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I have also used this one:

Bicarb. potass. ℥ iij.
Tinc. Nucus vom, ℥ ij.
Liq. Arsen. sodii, ℥ ss.
Tinc Capsici, ℥ ts.
Infus Casceril, ad. ℥ ir.

A tablespoonful thrice daily before meals. I have frequently had good results from sponging the nape of the neck with hot water and from the application of a mustard plaster over the epigastric region or the upper part of the spine. A light repast at bed-time, just enough to excite some vascular determination to the stomach without accelerating the heart's action, is frequently sufficient to deplete the cerebral vessels.

If a patient wake during the night and is unable to fall asleep again, he should on no account lie tossing about worrying at his fate. Such a course invariably prevents the return of sleep. It is better to rise and walk two or three times around the room, brush the hair, take a drink of water and then go back to bed.

A tablespoonful of whiskey diluted with water or milk, taken at bed time with a biscuit, grapes or raisins, is a useful hypnotic. Local applications of menthol, aconite, veratria, belladonna, chloroform, opium, heat blisters, and electricity are each and all useful. In the anæmic and weakly various tonics as iron, phosphorus, and quinine, by improving the general health and relieving pain, admit of sleep.

Antipyrine, morphine, chloral hydrate, urathene, paraldehyde are all used in cases of insomnia, and while I do not deny their usefulness, I think they should be used with discretion, owing to the great number of men and women who yearly become habitues.

DISCUSSION.

DR. MINER.—Dr. Geist recently read a paper on "The Theory of the Extension and Retraction of the Neuron Terminal" and explained a very plausible hypothesis of Lepene, Duval and Dercune regarding the condition of the neurons during sleep and waking hours. It was essential that the protoplasmic processes of the neurons undergo amœboid movements, contracting during sleep in such a manner as to pro-

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duce a functional isolation of each of them and expanding again on waking, so that all previous relations between them are resumed. This theory is a very attractive one and its simplicity conduces to clearness of views in considering the functions of nervous matter. In dreamless sleep it may be assumed that all the neurons which participate in processes of thought become disconnected from one another. Dreams are accounted for by supposing that for some reason certain neurons or groups of neurons do not fully contract and thus incomplete cerebration continues. A sensory stimlus from the stomach, for instance after a hearty supper, pretty generally causes an expansion of and contact between the neurons in which certain memories are stored, without waking the sleeper and he dreams accordingly. In insomnia the mechanism which normally brings about contraction of the neurons and diminishes cerebral circulation, does not act promptly and cerebration continues.

In the simplest forms of functional insomnia· I have found trinol of great service. After giving the drug in doses of ten to fifteen grains in hot milk at bed-time for a few nights until the bad habit of sleeplessness is broken, then the use of a placebo as sodis bicarbonate in the heated milk as a substitute for the drug often proves satisfactory. In the insomnia and irritability of melancholia, small doses of opium seem to be almost a specific. In mild insomina of old people asafœtida often proves satisfactory. There is little doubt in my mind but that our most powerful and most satisfactory hypnotic, in most cases, is chloral, or a combination of chloral and the bromides.

Dr. B. J. Weatherby.—Many persons who try the counting and similar methods of monotony become more wakeful in the attempt to keep the numbers straight and in order. One of the best and simplest ways of producing sleep in the cases of cerebral typeremia of brain workers, is a cup of hot milk taken immediately before retiring, or some similar light lunch. In the insomnia of the typhoid state a very large dose of whiskey or brandy often is followed by sound and refreshing sleep. In old people a nerve tonic like dilute phosphoric acid will often produce sleep after bromides fail.

Dr. L. L. Rogers.—In nervous cases of insomnia I like the effect of hypodermatic and stomachic use of hydrobromate of hyoscine, bromides, chloral, opiates and asafoetida are good. The application of three or four leeches to the nape of the neck of some nervous patients, especially where there is distension of the blood vessels of the head and brain, proves effectual.

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In chronic insomnia I look carefully to the air in the sleeping room, often finding it far from what it should be. Plenty of fresh air is necessary. A want of sufficiently frequent bathing, I have often thought, made some cases worse. Hence a rapid cold or warm sponge bath, followed by brisk rubbing of the surface of the body every night before retiring, is of value.

Walking fast around a square or two or exercising with a chest weight to the extent of getting thoroughly warmed just before retiring, will effect some cases very favorably.

After becoming restless and unable to sleep for some time, simply going to another bed, preferably in a cooler room, has often had the desired effect. Superstitution says sleep so that as you rise you will face the east; I say try facing different ways and choose the one that answers the best purpose.

DR. W. H. LEWIS.—I have, in the short time I have practiced medicine, had a little experience with insomnia; some of it of a very distressing character. Some cases were due to excessive mental activity, others to extreme physical exhaustion due to overwork and others due to the toxins produced by disease. I am led to believe the latter two are about the same in cause and effect, i. e. the non-elimination of tissue waste or, as it has become, toxins.

In the cases due to mental activity, I have found the various cardiac sedatives, in conjunction with such hypnotics as morphine and chloral, preparations of bromine, hyoscyanus and such, to have a happy effect, especially where methods to relieve the cerebral congestion by hot foot baths, etc., have failed. But for the insomnia produced by the toxin, my experience is not at all flattering. I cannot fully endorse the remarks made about morphine. I have been disappointed in the administration of both fractional and all most toxic doses; notably in one case of cholera morbus, about two years ago, where muscular spasms set in; large doses of morphine not only failed to relieve the tonic spasm of the legs but even failed as a hypnotic; the patient died within twenty-four hours after the spasm set in. I have other cases where morphine failed of its mission. One thing frequently lost sight of in the administration of morphine is, perhaps, the idiosyncrasy of the patient. I would not, however, attempt to say to what extent that influences the action of the drug, but I do think that in the treatment of insomnia, the cause of the trouble, i. e. mental activity, or the toxins will have a great bearing on the success of the same.

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BRONCHO-PNEUMONIA IN CHILDHOOD.

BY DR. J. I. ROE, WILKES-BARRE, PA.

READ APRIL 20, 1898.

As I look back over my experience in the practice of medicine, I believe there has been no affection which I have been called upon so frequently to treat as that which forms the subject of this paper. I am very sure that this is the case when I consider, as a separate class, those diseases which are peculiar to infancy and early childhood. Of 726 consecutive autopsies in the New York Infant Asylum, 322 or over 44% showed the cause of death to have been pneumonia. We thus see that it is a very large factor in the mortality of infancy.

The pneumonia of infancy is most often of the catarrhal or lobular variety know as broncho-pneumonia. Another report of the New York Infant Asylum, covering 370 cases of pneumonia, shows in a striking manner the relative frequency of lobar and broncho-pneumonia. This report covers all the cases of acute primary pneumonia occuring during a period of seven years, and is as follows:

Under 6 months,	broncho-pneumonia	73	cases;	lobar	11	cases.
6 to 12	"	"	"	96	"	"	29	"
Second year,	"	"	73	"	"	40	"
Third	"	"	"	19	"	"	23	"
Fourth	"	"	"	0	"	"	6	"

It will be observed by this table that during the first two years 75% of the cases were broncho-pneumonia. These were all cases of primary pneumonia. When we take into consideration secondary pneumonia we find that a still larger percentage is of the lobular variety.

Broncho-pneumonia is essentially a disease of infancy, as it seldom occurs in childhood after the fourth or fifth year. Holt records 426 cases occuring as follows:

During the first year,	244	cases,	or	53%
" " second year,	142	"	"	33%
" " third year,	46	"	"	11%
" " fourth year,	10	"	"	2%
" " fifth year,	4	"	"	1%

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Male children seem to be somewhat more susceptible than female, the proportion in primary cases being five to four ; in seconday cases about an equal number of each sex is affected.

Broncho-pneumonia prevails throughout the entire year, but the great majority of cases occur during the winter and spring, about 70% of all cases being observed during the cold season.

While all classes are subject to this disease, its greatest prevalence is found among delicate and badly nourished children and those having poor hygienic surroundings. Children who have previously suffered from bronchitis are especially susceptible to this form of pneumonia. Undue exposure to cold is perhaps the most frequent exciting cause. It is a disease which is secondary to, or frequently complicates, other diseases. The following table by Holt is a good illustration of this. Four hundred and forty-three cases were classified as follows :

Primary,	164.
Secondary to bronchitis of the large tubes,	41.
Complicating measles,	89.
" pertussis,	66.
" diphtheria,	47.
" acute ilio–colitis,	19.
" scarlet fever,	7.
" influenza,	6.
" varicella,	2.
" erysipelas,	2.

The *bacteriology* of broncho-pneumonia may be summarized as follows : (Holt :) In the primary cases the pneumococcus is nearly always present, and in a large proportion of the cases it occurs alone. In cases of mixed infection it is most frequently associated with the streptococcus. The secondary cases are usually due to a mixed infection. The pneumococcus is found in a large number of these cases, but plays a less important part than the streptococcus, particularly in cases complicating measles, diphtheria and scarlet fever. The staphylococcus is next in point of frequency in the mixed cases, and it may occur alone. Still less important is the part taken by Friedlander's bacillus both in primary and secondary cases.

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We have not yet sufficient data definitely to connect the different forms of infection either with any set of lesions or with any group of clinical symptoms. The cases due to streptococcus infection are usually the worst forms, and are apt to show widely disseminated lesions. The cases in which the onset and clinical history resemble lobar pneumonia, and where there are found extensive areas of consolidation, and often excessive pleurisy, are usually due to the pneumococcus.

The *lesions* of this disease are well expressed by its name, broncho-pneumonia. The inflammatory action usually begins in the larger bronchial tubes, and extending through the smaller tubes, finally involves the pulmonary lobules. It sometimes begins at the same time in the air vesicles and smaller bronchi, as both are found involved in cases which die in a few hours after the onset of the attack. Then, again, there are cases in which parts of the lung are involved and the bronchi are not affected, there being larger or smaller areas of pneumonia scattered through the lung. These are more properly cases of lobular pneumonia.

In eighty-two per cent. of Holt's autopsies evidences of extensive disease were found in both lungs. "The parts most affected were the lower lobes posteriorly; next to this the posterior part of both the upper and lower lobes. The left lower lobe was more extensively diseased than the right in over two-thirds of the cases. Only a single lobe was involved in but nine per cent. of the cases." The anterior portion of the lung is seldom affected, and when it is, the right apex is usually the part involved. The pathological processes are much more irregular than are those of lobar pneumonia as observed in the adult. "There are a certain number of cases which appear to follow tolerably well defined stages of congestion, red hepatization, gray hepatization, and resolution; but the disease may be arrested at any of the stages and the case recover, or death may occur at any stage and there may be found at autopsy different portions of the lung representing all the stages mentioned. Resolution may take place before any consolidation recognizable by physical signs has occurred; in such cases it is usually rapid and complete. If there has been

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consolidation, resolution may then take place after two or three weeks and be complete, or it may be delayed for five or six weeks and still be complete. In many cases, especially those in which it is delayed, resolution is only partial and there are relapses or recurring attacks." Chronic interstitial pneumonia sometimes results and sometimes the attacks are followed by tuberculosis.

Along with the lesions described several other conditions are frequently associated. In most cases of over four days duration pleurisy is found to exist over the consolidated areas, usually in the form of exudation—sometimes, however, a small quantity of serum is found in the pleural sac. Large serous effusion is rare. Empyema, while more frequent in lobar pneumonia, sometimes occurs during the acute stage of this disease, and sometimes while the attack is subsiding. Vesicular emphysema is sometimes present, especially in the protracted cases. Small areas of gangrene and minute, multiple abscesses are not uncommon in the worst cases.

The *symptoms* presented by broncho-pneumonia are indeed exceedingly varied. No typical course is followed. While there is a great variety in these cases, they can, for convenience of description, be grouped into three classes.

First, the acute congestive. This usually occurs in young infants and is very frequently overlooked or is treated for some other ailment. Its entire course may be less than twenty-four hours. "High temperature, extreme prostration, cyanosis and rapid respiration may be the only symptoms. The temperature varies from 104 to 107, usually rising steadily until death occurs. Cough is frequently absent. Cerebral symptoms are often marked, convulsions not infrequently terminating the attack. The physical signs are of little value, and are almost entirely absent. Diagonsis is most difficult and it is often impossible until the autopsy is made. While this form is usually rapidly fatal, a small percentage of cases recover—the symptoms subsiding rapidly and the lung clearing up in four or five days. Holt explains the great severity of these cases on mechanical grounds. "The air vesicles of the infant's lung are so small that the function of the lung is interfered with by very

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intense engorgement almost as much as by consolidation. This causes the sudden and intense embarrassment of respiration which it is so difficult for the system to tolerate."

A second variety of broncho-pneumonia and one that is quite rare, is the acute disseminated—or as it is sometimes called, catharrhal bronchitis. This is an acute inflammation of the medium sized and small bronchi, but the finest bronchi are not involved. Autopsies of these cases always disclose small areas of pneumonia as well. The attack begins suddenly; there is moderate fever, very rapid pulse, a most distressing cough, severe dyspnoea and usually cyanosis. The breathing is quite characteristic, being often from 80 to 100 per minute, and there is marked recession of the soft parts of the chest during inspiration. Rales are present over the entire chest, at first sibilant, and later subcrepitant mixed with coarse, moist rales. There is exaggerated resonance on percussion and no evidence of consolidation anywhere. Emphysema is usually present. While this form of the disease is very grave, it is not so fatal as the congestive. Cases that survive three or four days usually recover as a rule quite rapidly. Instead of this in some cases the constitutional symptoms continue and the ordinary broncho-pneumonia develops.

We now come to consider "broncho-pneumonia of the common type," such as we usually meet with in general practice. The attack is generally quite sudden in its onset; in a few cases —about ten per cent.—it begins with a bronchitis of the large tubes. The temperature as a rule is quite high, although in some cases there may be a fatal termination and the temperature never go above 101. It is not continuous, but there is marked fluctuation—as much as four or five degrees in some cases. The fever is usually less in very young and delicate children than it is in those who are older and more robust. Fever usually lasts from one to three weeks.

The pulse is very fast—rather strong at first but later in the course of the disease becoming weak and irregular. Its character is of more importance than its rate. The danger, however, in this disease is not so much from cardiac failure, as from respiratory. The breathing is always much embarrassed, the

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dyspnoea being of that extreme character that makes these little patients most pitiable objects indeed. There is dilation of the alae nasi and a recession of the soft chest walls with each inspiration. The respirations are very fast, 60 to 100, and Holt reports having seen it as high as 120 per minute.

The cough is usually very distressing; in some cases being almost incessant. There is no expectoration, at least young children do not possess the ability of spitting out the mucus which is raised, but it is either swallowed or is aspirated into the trachea or tubes. "If during a severe paroxysm the patient is turned upon his face or inverted, much of this mucus may be dislodged." A good strong cough is always a favorable symptom, while suppression of the cough is a bad indication.

There is, as a rule, very little pain unless the pleural surfaces are considerably affected.

One of the most unfavorable symptoms is cyanosis. This may be slight, affecting only the finger-ends or the lips, or it may, in severe cases, discolor the whole surface of the body. It is always a grave symptom and portends danger, calling for extreme watchfulness and vigorous treatment.

The nervous system is frequently affected; convulsions may occur—usually in the later stages of the disease—and more frequently in secondary than in primary cases. Occasionally there is a mild delirium, and other cerebral symptoms which resemble very closely those of meningitis. We should bear in mind in these cases the dictum of Stokes, that "there is no single nervous symptom which may not and does not occur independently of any appreciable lesion of the brain, nerves, or spinal cord." I have known of cases where the lung trouble was entirely overlooked, and the cerebral symptoms given undue prominence.

There is quite apt to be some gastro-enteric trouble with this disease. Vomiting and diarrhœa are in some cases serious complications, the distention of the stomach making the dyspnœa more severe, and the diarrhœa producing serious prostration. Improper feeding and over-medication are often responsible for this condition.

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The urine is scanty, high colored and loaded with urates. It seldom contains albumen.

The *duration* of the disease is considerably longer than lobar pneumonia, and it does not, as a rule, have the sudden termination which is so characteristic of that disease. The following table is interesting as showing the duration of the fever. Two hundred and thirty-one cases are reported by Holt, the majority of which were primary. Of the 169 cases that were fatal:

There died during the first six days, ... 25 %
" " between the seventh and twenty-first days, . 55.5 "
" " " " twenty-first and sixtieth days, . 19.5 "

Of seventy-eight cases which recovered, the duration of the fever was:

Less than seven days, ... 11.5 %
From seven to twenty-one days, ... 66.5 "
" twenty-one to ninety days, ... 21.9 "

The *physical signs* may very conveniently be divided into three classes:

1st. Cases without consolidation.
2d. With areas of partial consolidation.
3d. With areas of consolidation more or less complete.

Quite a large proportion of cases—about forty per cent.—shows no evidence of consolidation during any period of the disease. The first stage, that of congestion of the lungs, gives feeble breathing over the affected area, with slightly diminished resonance. Sonorous and fine sibilant rales show involvement of the larger and smaller bronchi respectively. As the disease progresses we get very fine moist rales in one or both lower lobes posteriorly. "These localized fine rales are the first distinctive sign of broncho-pneumonia." In these cases the areas of pneumonia are so limited that further physical signs are not developed.

In the second class of cases there are small areas of partial consolidation. Percussion gives negative results, but careful ausculation will detect near the spine an area where the respiration is broncho-vesicular in character, approaching bronchial breathing more and more as the consolidation increases.

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In the third class of cases we get dulness on percussion, but not the complete dullness which we find in lobar pneumonia. This is due to the fact that the consolidation is superficial, and that the consolidated portion contains many alveoli which still contain air. There is increased vocal fremitus. These signs of consolidation are confined to the posterior aspect of the chest, and rarely extend beyond the axillary line. As the case advances the signs of consolidation become more complete and approach in some cases that of lobar pneumonia, differing, however, in that the dulness gradually shades off and is not so abrupt in its line of demarcation. Both lungs are usually affected although one side is always to a greater degree than the other.

In considering the *diagnosis* of broncho-pneumonia the chief difficulty is to exclude bronchitis, especially that affecting the smaller tubes. This is sometimes impossible in the early stages. Careful observation for a day or two usually settles the question however, for we find in bronchitis that while the temperature at first is quite high, in twenty-four or forty-eight hours it subsides to 100 or 101°. The prostration is not so great, and the rales are heard both in front and behind and usually over both sides, while in broncho-pneumonia they are more localized posteriorly, the temperature is more persistent, and the child is more prostrated. "Localized bronchitis," says Holt, is always to be interpreted as broncho-pneumonia, provided tuberculosis can be excluded. The following table shows the most characteristic differences between broncho and lobar pneumonia:

BRONCHO-PNEUMONIA.	LOBAR PNEUMONIA.
1. More than half the cases secondary.	1. Almost always primary.
2. Under three, chiefly under two years.	2. Most common between three and eight.
3. Occurs more frequently in delicate and debilitated children.	3. More often in those previously healthy.
4. Onset often gradual; sometimes insidious.	4. Onset sudden, with well-marked symptoms.

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5. No typical course; fever often lasts three or four weeks; rarely terminates by crisis.	5. Typical course; crisis usually from fifth to eighth day.
6. Involves both lungs as a rule, most frequently lower lobes posteriorly.	6. Usually one lobe or part of a lobe.
7. Signs of bronchitis mingled with those of consolidation; rales in other parts of same lung, or in opposite lung, throughout the disease.	7. Rales only early and during resolution; frequently no signs in opposite lung.
8. Consolidation later, or may be none; often incomplete and shades off gradually.	8. Consolidation earlier and complete; area sharply defined.
9 Resolution slow and often incomplete.	9. Resolution rapid, usually complete in a week.
10. Relapses frequent.	10. Relapses rare.
11. Prognosis serious.	11. Prognosis good.
12. Hospital mortality fifty per cent. of primary cases; sixty-five per cent. of all cases.	12. Mortality four per cent. of all cases.

The *prognosis* of broncho-pneumonia is always grave. The mortality in private practice is from ten to thirty per cent. In hospital practice it is much greater. Cases following measles, diphtheria and whooping cough are very fatal, recovery being an exception. Mortality varies directly with the age—during the first year being sixty-six per cent., second year fifty-five per cent., third year thirty-three per cent., fourth year sixteen per cent.

The *treatment* of broncho-pneumonia is prophylactic and expectant. Much can be done in the way of prevention by giving prompt attention to all cases of bronchitis, as this is the forerunner of many cases of this form of pneumonia.

The room in which a case is to be cared for should be large and well ventilated. If possible the child should be removed to another room, and the air thoroughly changed several times during the day. Care should be taken to change the position of the patient frequently, and it should not be kept in bed all the time, but held in the nurse's lap at intervals, for this purpose.

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Feeding is important, and every precaution should be taken to prevent disturbance of the intestinal tract, as this is one of the most serious complications. Fluids should be given freely, and food should be liquid and easily digested, if not predigested.

I have great faith in the application of cold in the early stages of this disease. In all cases where the temperature is 102.5 or 103 the chest should be wrapped in a compress wrung out of water at a temperature of about 75°. These compresses should be covered with a dry towel or oil silk, and should be changed every half hour until the temperature reaches 100 or 101; then the interval may be lengthened to one or two hours, according to the temperature. I am sure that I have seen many cases aborted, and all cases benefitted by these applications. In cases where the temperature does not reach 103, counter-irritation by camphorated oil and turpentine, or mustard paste, and the use of the oil silk cotton jacket are advised.

Medicinally, I believe we have in Norwood's tincture of veratrum viride a most valuable remedy in the congestive stage of every form of pneumonia. Given in one-half to one drop doses every hour it will certainly exercise a control over the circulation that is often marvelous. It should be continued in this dose until the pulse is reduced to 90 or 100, and then in smaller doses as may be required. Unless some benefit is noted within twenty-four or thirty-six hours it is best to withdraw this remedy, and combat the disease by heart and respiratory stimulants. Strychnia, alcohol, and atropine are of the greatest value, and given intelligently will carry many a doubtful case to a safe issue.

I can speak of emetics and expectorant drugs only to condemn them; they not only do no good, but are very apt to do much harm by causing disturbance of the stomach and general depression of the vital forces.

For the troublesome cough Holt recommends very highly the use of medicated inhalations—such as lime water, creosote, terebine, eucalyptus, &c. For this purpose a croup kettle and tent, or a steam atomizer are needed. I have had

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only a limited experience with this form of medication in these cases, but believe it valuable, and shall make use of it to a greater extent in the future.

To quiet the restlessness, cold or tepid sponging is useful. While phenacetin and like drugs are to be condemned as antipyretics, I think they are useful to quiet the nervous condition into which some of these cases get. In small doses, guarded by a stimulant, they may be safely used. Opium is to be avoided, unless there is severe pain, and should then be given very cautiously. In sudden attacks of general collapse with cyanosis, nitro-glycerine, nitrite of amyl, and whiskey should be given, and the patient put in a hot mustard bath. In summing up the treatment it must be said that while we can do very little for the disease, we can do much for the patient, and attention to the details of careful nursing, the avoidance of over-medication, and the use of a wise judgment in conserving the forces of nature, will be rewarded by recovery in many cases of this most dangerous ailment.

DISCUSSION.

W. H. FAULDS.—I most heartily indorse the treatment recommended by the essayist for broncho-pneumonia. For many years I used what I now call the old treatment of this affection, namely: poultices, stimulants and expectorants. I was afraid to use veratrum viride for the reason that it was condemned by so many teachers and writers in the profession. We were then told not to use this remedy in any stage of the disease because its depressing effects on the heart, even in the first stages, hastened the heart failure, the condition above all others to be dreaded in this affection. Within the past few years, I have abandoned this method of treatement and now give veratrum viride in the congestive stage of all forms of pneumonia, unless the heart impulse is such as to furnish a positive contra indication. Sometimes in these cases in the early stages we find the temperature high, pulse small but tense, which condition might be mistaken for one of weakness and which is nearly always aggravated by stimulants. Symptoms which yield readily to the physiological effects of veratrum viride, and when so used I have yet to see any permanent depressing effects upon the heart muscle. I am inclined to agree with Dr. Long that this remedy is probably not a heart depressant in the sense in

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which we have been led to regard it. Regarding the use of cold sponging and cold applications to the chest I believe they should take the place of all medicines used for the reduction of temperature. They will in most cases render the use of viratrum viride unnecessary and I have never seen anything but good result from their use. If I were confined to but one remedy in the treatement of all forms of pneumonia that remedy would be cold water judiciously employed. Strychnia in the latter stages, when we have true heart failure, is invaluable. In short, if those who have followed the old treatement will adopt that outlined by Dr. Roe in his paper, I feel sure they will be pleased with the result.

DR. MATLACK.—I think that broncho-pneumonia as secondary to other diseases, that is after measels, scarlet fever, whooping cough, etc., is a very insidious developement. In many cases it is quite similiar to tuberculsis and may be mistaken for it. I believe the infection is largely due to microbes which inhabit the upper respiratory tract.

I have never used veratrum viride in cases of broncho-pneumonia because it has seemed to me to be too depressing; the condition of the patient is bad anyhow and should not be further depressed. Support the heart, sustain the breathing. Strychnia should be used early.

Very little feeding is necessary, especially of albuminous food, for when a child has a temperature of 104° the stomach does not secrete gastric juice. Farinaceous food is better borne than albuminous, even than beef tea. Good ventilation, intelligent nursing and cold water are important factors in the management of broncho-pneumonia.

DR. G. A. CLARK.—I must differ somewhat from the essayist as to the treatment of broncho-pneumonia, even at the risk of being considered old fashioned. The disease is seen oftenest among the poorer class of families who cannot afford to employ a trained nurse, a fact which, to some extent, influences the method of treatement. Remedies which are of advantage in the hands of a competent attendant, cannot be safely used otherwise. I prefer the hot poultice, usually with about one-sixth mustard and covered with oiled silk, or the cotton jacket if I cannot depend on the method of application of the poultice, to cold applications to the chest in the treatment of this disease. I also get good results from the use of salines, such as citrate of potass. or liq. ammon. acetas, together with wine of ipecac in the early stage until we get free secretions, and later non-stimulating treatment, such as aromatic spirits of ammonia. In

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the early stages I have preferred the use of tinct. aconite to veratrum viride and give it in quite small doses, one-tenth to one-half minnim, frequently repeated.

I agree with the essayist firmly in the use of strychnia as a cardiac and respiratory stimulant, also in the use of brandy if further stimulation is necessary.

DR. ROE.—I would like to emphasize the good opinion I have of cold water. Formerly I used cold compresses freely. Later, without good reason, I abandoned them and resorted to the oiled silk jacket. For the last three years I have used cold compresses in every case of pneumonia when the temperature has reached 103°.

It stimulates respiration, quiets the nervous system and gives rest. I have never seen any ill effects follow the use of cold water. At first it requires courage to use it. If one can strongly recommend a remedy it will be accepted.

In only one case did I meet with objections, but it was used and with good effect. I believe with Dr. Boardman Reed, that no one remedy is so good in the treatment of pneumonia in children as cold water. As to veratrum viride, it should be used with caution. With a weak pulse and low condition it should not be used; but in the first twenty-four to thirty-six hours it is an excellent remedy, given to the extent of producing physiological effects. I have never seen any ill effects from its use. It has in itself the quality to warn off danger as it generally produces vomiting if pushed. Given intelligently it is an excellent remedy.

DIPHTHERIA.

BY DR. W. H. FAULDS, KINGSTON, PA.

READ MAY 4, 1898.

To those of us who can go back twenty or twenty-five years and recall the different treatments for diphtheria in vogue during the time, such as chlorate of potassium and iron, bichloride of mercury and iron, calomel in large and small doses, local applications of nitrate of silver, etc., and at the same time call to mind the number of malignant cases of diphtheria and diphtheritic croup in which our remedies were of no avail; in short, when we remember that the mortality rate during epidemics

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of diphtheria ranged from thirty to sixty per cent. under the use of these remedies, and in cases of diphtheritic croup was still higher, probably from ninety to ninety-five per cent., and then contrast this condition of things with the results obtained under the present treatment by antitoxin, we are not surprised that our secretary has determined to keep this topic prominently before us.

Viewing the present status of the treatment of diphtheria from the standpoint of my own experience, I believe we are justified in saying that in almost every instance in which antitoxin is properly administered, in sufficient doses, and within twenty-four hours of initiatory symptoms, there will be complete and comparatively rapid recovery. During the past two and a half years I have treated seventy cases of diphtheria with this remedy with but two deaths, one from pneumonia following croup and the other from fatal syncope six weeks from date of attack. The fatal case of croup occured in a child that had been ill for three days before I saw it and was much exhausted by vomiting from the administration of emetics. The other fatal case was a child of seven years and had been ill three days before antitoxin was used. Of the seventy treated, eleven were cases of croup. Five of these recovered without intubation and of the six cases intubated one died.

My success, I believe, is due to my having been called early, also to the prompt administration of the remedy in full doses, repeating it or doubling the dose if there was no improvement in the symptoms. My first experience with anti-toxin was in a family where two lay dead of malignant diphtheria and where three other children were in the early stages of the disease. All had the premonitory symptoms of malignant cases and fearing that they, too, would die I determined to try antitoxin. They all recovered. In a few days I had another opportunity of testing its virtues on four of the neighboring children, one of whom besides having the tonsils covered with membrane, had diphtheritic laryngitis. This was the first ease of genuine croupous diphtheria up to that time I had ever seen recover. It would be tedious for me to give a detailed account of all the cases I have treated with this remedy.

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However, I do not now recall but one case in which the membrane and glandular swelling of the neck persisted for a longer time than seven days, and in a vast majority of the cases these symptoms did not last longer than from three to five days from the commencement of the treatment. In some of the cases of croup treated without intubation, there was marked improvement in the breathing in from six to twelve hours, though from four to six days elapsed before the croupy cough subsided. In one of the cases intubated, the tube was left in the larnyx seven days, in four cases five days, and in one case six days. There was some hoarseness for several days after the tube was removed. There was also some difficulty in swallowing in all of the intubated cases while the tube was in the larnyx. There seems to be a popular impression, due probably to the teachings of some physician, that paralysis is more common under the use of antitoxin than when other remedies are employed. My experience has been the reverse of this. Of the seventy cases treated, but four have had noticeable symptoms of this heretofore common sequel of the disease, the paralysis occuring in those whose treatment was delayed forty-eight hours after the appearance of the membrane, and at least twenty-four hours after there was pronounced glandular enlargement. I believe the opinion held by those who have had a large experience in the use of antitoxin is, that when it is used early and in sufficient doses paralysis rarely follows. This statement, I believe, will be found to be true also of all the complications and sequalæ of the disease; thus showing the importance of early and vigorous treatment. In four of the cases in which convalescence was tardy I found albumen in the urine in small quantity. It disappeared in about ten days under the use of Basham's mixture. A dose of antitoxin was administered to ten children who were exposed to the infection, and notwithstanding the fact that these children were allowed to mingle with the sick, none took the disease. One of these, a girl of nine years, took almost complete charge of her sister, two years of age, whose tonsils were covered with diphtheritic membrane, with the same gratifying result.

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In regard to the alleged bad effects of antitoxin on the system, I have yet to see one symptom indicative of deleterious effects from the use of this remedy. On the contrary, when employed early its use is attended by what seems to be a feeling of exhiliaration and well-being—due undoubtedly to the neutralization of the poison of diphtheria—and occurs with such uniformity as to make it almost impossible to attribute the symptom to anything but the curative effects of the antitoxin.

One word about the dose of antitoxin: Where there is much elevation of temperature, vomiting and drowsiness, along with rapid formation of diphtheritic membrane and commencing glandular enlargement, the first dose should be at least 2,000 units for a child two years of age or over, and this dose should be repeated in six hours if the temperature is still high and there is no improvement in the general condition of the patient. I can readily understand why in some localities antitoxin has fallen into disrepute. Given as a last resort, when the nervous system and almost every organ of the body has been poisoned and the glandular system is in the incipient stages of decomposition, which nothing but the disinfecting fluid of the undertaker will arrest, it would seem that no physician would expect beneficial results from any remedy. Another reason for failure may be found in the small doses given where larger doses are indicated. It would be unscientific, knowing the source of antitoxin, to expect a small dose of the remedy to neutralize a large dose of the poison of diphtheria, and yet I have in mind a fatal case of malignant diphtheria in a patient sixteen years of age, to whom but one dose of 500 units of antitoxin was administered. To such physicians we would say: First learn how to use a remedy before you condemn it.

Prior to the discovery of antitoxin many of us entered upon the treatment of a case of diphtheria with trepidation, fearing the result. Now, with this remedy and intubation, we can almost assure the anxious parents that their little one will be saved to them, and that those exposed to the infection may have immunity by the admistration of a single dose of the remedy.

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DISCUSSION.

DR. J. ANSON SINGER, Forty Fort, Pa.—If anything more than the reading of medical literature of the day is required to convince us of the efficacy of the antitoxin treatment of diphtheria, we need only to give it a fair trial in our own practice and the fact will be fully established. I have no hesitancy in saying that I am a firm believer in the use of antitoxin and believe it should be used early and in sufficiently large doses to bring about its physiological effect.

I have used it in every case I have had in the last few years and with very happy results. While I do not fail to give other treatment in conjunction with this remedy, I believe that the antitoxin treatment alone is sufficient for all cases without complications.

The statistics of Germany show that from 1885 to the year 1894 there were 119,038 deaths from diphtheria or croup, the average number thus being 11,904 per annum. The maximum was reached in 1893, there being in that year 15,860 deaths and the minimum in 1888 with 9,934 deaths. In 1895 when diphtheria antitoxin was first used on a considerable scale, the number of deaths went down to 7266. The diphtheria death-rate was 1069 per 10,000 of the population in the preceding ten years, and only 54 in 1895, so that the mortality had fallen 49.48 per cent. Of 100 deaths 4.53 were caused by diphtheria from 1885 to 1894, and only 2.53 in 1895. The decrease of the death-rate from diphtheria was almost uniform in every district of the Empire; the prevalence of the disease was however, about the same as it had been for the last twenty years, and it is therefore unquestionable that the serum treatment has had the effect of producing a remarkable improvement. But we need not go so far away from home to prove its utility; if we take our own statistics and the reports of the members of this society, there can be no doubt but that the present status of the treatment for diphtheria is far superior to the old line of treatment.

DR. HAKES.—It is a question whether it is wise to give the credit to antitoxin as a specific when we recall the experience and remedies of the past. In all the directions of the antitoxin manufacturers and its advocates, they advise that the old remedies be employed with antitoxin. It is the duty of the younger physicians to determine its standing and efficiency, and if it is, as is claimed, a specific against the dread disease, it should be used exclusively.

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DR. LEWIS H. TAYLOR.—I do not feel the same degree of fear as that expressed by Dr. Hakes in regard to the use of antitoxin. It seems to me it is not a question as to whether we would dare to treat our cases with antitoxin alone, but would we dare to treat a case of diphtheria and omit antitoxin. We have had various discussions on diphtheria before this society and I recall one of a few years ago in which members stated that in cases of laryngal diphtheria all the patients died. We hear of a very gratifying change of opinion in these days. In an address before the Academy of Medicine in New York, a few years ago, the president stated that any practitioner of medicine would have an ample working library from the works of members of the Academy alone. So in this matter, if I had no other testimony in its favor, the testimony given in the past two or three years by members of the Luzerne County Medical Society alone would be sufficient to convince me that I dare not omit it if I were about to treat a case of diphtheria.

It is true that we still use other remedies and do not rely exclusively upon antitoxin. But we are still in the experimental stage, and the matter is not fully and absolutely settled. There are other diseases of which the same may be said; diseases with which we have been battling for many years and yet we are not ready to settle upon any one remedy and use that exclusively of all others. What remedy can we mention for the cure of pneumonia that all present will agree to use to the exclusion of all others? Let us not deny the value of antitoxin because we use other adjuvants in connection with it.

DR. W. L. HARTMAN.—I desire to contribute my mite this evening. During a prolonged epidemic of the disease, from October, 1895, to January, 1896, I had twenty-two successive, well marked cases of diphtheria, all of which ended in complete recovery. Antitoxin was used in every case with the usual medication of bichloride and tinct. ferri and local applications. The antitoxin was always procured and applied immediately on the diagnosis of the case, usually three injections being made eight to twelve hours apart.

Though I have used a full bottle of Mulford's No. 3, at the first dose—in reply to Dr. Hakes' query, I would say that about one year ago I saw a well marked case of forty-eight hours duration in a robust child two years of age. I introduced antitoxin and prescribed the medicine; at the second visit I was informed that the first dose of medicine had been ejected and no other effort made to give more. I had a wrestle with the child and concluded to give up the drugs and trust to the

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antidote; two more injections were given and the child made a prompt recovery.

DR. G. W. GUTHRIE.—I think antitoxin should hold a place beside vaccination. A very serious case of diphtheria of which I know, yielded readily and satisfactorily to antitoxin, and such has been my common experience. I feel sure that under the old methods of treatment I would have been powerless to avert death. With this new remedy diphtheria is robbed of its terrors. I rely upon antitoxin thoroughly and almost to the exclusion of other remedies and would not think of treating a case of diphtheria without it.

DR. HOWELL.—I advocate the use of antitoxin and in my practice am well satisfied with its results.

DR. SHOEMAKER.—In an outbreak of diphtheria at the Home for Friendless Children, antitoxin was used and produced good effects.

SYPHILIS.

BY DR. J. HARRIS JONES.

READ AT THE SEPTEMBER MEETING OF THE SOCIETY, 1882, AND RE-READ (BY REQUEST) MAY 18, 1898.

To-day, as you are aware, I have the honor to read before this society a paper upon SYPHILIS. I assure you that I feel very diffident in presenting this essay, as it is very unworthy of the important subject it is supposed to treat. Let me inform you at the outset that I have very little new and much less, if any, original matter to introduce.

As is well known to you the literature of this disease is voluminous. Indeed, whilst preparing this article the vastness of the subject was a source of much anxiety to me. I shall, however, confine my remarks to only a few of the most important features of the disease, those features that would, perhaps, be most likely to interest an assembly like the present one.

Respecting the origin of syphilis nothing definite is known. The first account we have of its existence in Europe is in the

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fifteenth century; how it got there no one can tell. The aborigines of America, by some, are credited with having given the disease to members of Columbus's crew when visiting this country, and the latter, on their arrival home, are said to have very liberally disseminated it among Europeans. I think the evidence of American origin is very unsatisfactory. It is very probable that syphilis is a more antiquated disease than historians will have us believe. It has by this time become almost universal; there being scarcely a portion of the civilized globe that cannot boast of having more than enough of it, and even among barbarians, residing in remote and unfrequented regions, it is not by any means a rare affection. It is a disease practically uncommunicable to any of the lower animals.

Bradley, however, states that he has, after many ineffectual attempts, succeeded in producing the disease in a kitten and a guinea-pig.

The writer of this article in his student days remembers making several inoculations with syphilltic virus upon some of the lower animals, but always without a shadow of success. The animals selected were cats, rabbits, and dogs, and the site of the inoculation was either the buccal or vaginal mucous membrane. In every case all traces of the punctures made disappeared in a few days. A careful inspection of the parts was kept up for a period extending over two months, but nothing whatever was discovered locally. Some of these animals were killed, and there was not a particle of evidence sustaining a constitutional intoxication discoverable in any of the internal organs.

Unfortunately the term syphilis is not a very good one; the general acceptation of the word is misleading, inasmuch as it conveys with it several forms of venereal disease. It would be better if the word were restricted to that form of disease which arises from a specific though undetermined poison, appearing first as a local trouble, but gradually, yet surely, becoming constitutional, and pursuing a course peculiar to itself. We cannot, however, hope for this until surgeons will have arrived at a more uniform understanding respecting the initial lesion. As you are aware, there are many varieties of venereal

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sores or chancres; they are divided into two great classes—the hard and the soft.

Many syphilographers believe that all arise from the one and same poison; others recognize at least two poisons as their cause, whilst a third school maintains that they originate from several distinct poisons. Hence have arisen the different doctrines of syphilis, known as the unal, dual and plural. It appears to me as very absurd to speak of the unality or plurality of things which have nothing in common. It is very probable that there are many poisons capable of producing veneal sores; but the true, hard, Hunterian chancre has a poison peculiar to itself, and though a local affection at first, it eventually becomes constitutional; and this is the only form that begets true syphilis. To favor this statement allow me to bring forward a few clinical facts concerning these various chancres wherewith I shall endeavor to show that the infecting one is the result of a specific poison which bears no relationship whatever to the poison or poisons which beget the soft or non-infecting variety.

First. The hard sore has a period of incubation varying from 18 to 42 days. The soft appears in a few hours or at most in a few days after exposure.

Second. Hard sores are usually single; never more than three. The soft rarely single; generally multiple.

Third. The secretion from a hard sore is scanty, unless irritated by applications. It contains nothing but cast off epithelial scales and serum. The secretion from a soft one is very profuse and purulent.

Fourth. The hard chancre never assumes phagadæna. The soft one is peculiarly liable to phagadænic action.

Fifth. The secretion from a hard sore is not autoinoculable. In the soft variety the secretion is autoinoculable.

Sixth. The hard sore causes an almost equal induration of all the lymphatic glands of the groin and elsewhere, which, however, have no tendency to suppurate, unless when occurring in debilitated, broken down or scrofulous subjects, and even then suppuration is an extremely rare occurrance. In the soft

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variety the fury of the poison appears to be centered in one of the proximal glands, and it is peculiarly liable to suppurate.

Seventh. Constitutional symptoms invariably appear after a hard sore, usually in six or eight weeks after the primary lesion, but in strong, robust individuals they may be delayed for a long time. I believe I have witnessed a case where they were postponed for twelve years. The soft variety is never followed by constitutional symptoms.

Eighth. One attack of the hard chancre generally protects the system from a second, but undoubtedly this is not always the case, especially when the first infection was mild and occurring in a person of robust health with strong eliminating powers. One attack of the soft kind offers no immunity against another.

Ninth. A hard sore in three or four days becomes surrounded by a hard base. This is due to an out-pouring of specific lymph and is the first sign of constitutional intoxication. The soft sore never assumes this hardness unless irritated by caustics—then it is purely an inflammatory action produced by the irritant.

Numerous experiments have been made with the secretions from these different sores, and from the results obtained some operators believe that they have proven conclusively that the hard and the soft chancres are identical in origin—the change in their appearance, etc., being due to the location and soil in which the poison has been implanted. It may, however, be fairly said (considering the material used and the manner the experiments were performed), that these operations cannot be regarded as conclusive proof of the unity of the poison, and that the soft sore is nothing more than a local and contagious disorder, differing in every feature from the true chancre. I fail to perceive a trace of kinship between them. They have but one feature in common and that is, both may be venereal. Nevertheless, there is an influential school who believe that the soft chancre may beget constitutional symptoms. It may be said that there is at least a possibility that this assertion is the outgrowth of a careless and an imperfect observation. It is possible to have a mixed sore, that is, one partaking the

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characters of both the hard and the soft chancre. In such a case it will always be found that the sore is soft at first—the induration not appearing for many days—not until a time corresponding to the usual incubative period of a hard chancre.

To show how easy it is to make a mistake of this kind, let me mention the case of a young man who consulted me not many months ago for a sore on the glans penis. It had all the appearances of a typical soft chancre. No irritants were applied to it, nothing but a simple astringent wash of Sulphate of Zinc. It showed a kindly disposition to heal, nevertheless a bubo appeared and suppurated. The young man contemplated marrying in a month or two and of course was very anxious about his trouble. I quieted his mind by assuring him that there would be no constitutional symptoms and that its existence would not prevent him from consummating his promise. A few days before the marriage was to come off he came to me with evidences of "secondaries." You can well imagine how crest-fallen I felt. I examined the part affected and on the site of the old sore I discovered the remains of a hard chancre. I directed his attention to this. He told me he had noticed a small pimple there,which gradually hardened, but had not attached much importance to it as it was insignificant in appearance when compared with its predecessor. He had not exposed himself to a fresh contagion and had undoubtedly contracted both forms together. Had I not seen this hard chancre I might have regarded this case as evidence of soft sores sometimes becoming constitutional.

Respecting the nature of the virus of true syphilis, nothing is known. It has never been analyzed or isolated. Probably it is, like other animal poisons, an acid one. Strenuous efforts are being made to establish a bacterial origin to syphilis. Some claim to have witnessed the little pests; I am afraid much importance cannot be placed upon their discovery.

The usual seat of a chancre is on the genitals, as these are the parts most commonly exposed, but any absorbent tissue of the body, if brought in contact with the poison may become the site of it. The constitutional symptoms are divided into three stages, viz: secondary, intermediary and tertiary. This

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classification is not a very scientific one, but it is extremely convenient. Each advancing stage is supposed to denote a deeper and more serious saturation of the tissues.

The first evidence of constitutional symptoms is the the hard base of the chancre. Soon the whole lymphatic glands enlarge and in about six or eight weeks other symptoms appear, such as eruptions on the skin, sore throat, falling out of the hair and periosteal inflammation of the bones.

The commonest variety of skin affection is roseola; oftentimes the scaldy kind, such as psoriasis is present. Soft condylomata appear on the buccal and lingual mucuous membranes. The periosteal inflammation is recognized by rheumatic-like pains and in a more advanced form by nodosities upon its surface. The pain of syphilis, no matter at what stage of the disease, is markedly nocturnal. This is a point worthy of much attention, for a correct diagnosis may sometimes be made by appreciating the existence of this singular feature. Of course it is not pathognomonic of the disease, but it is so constant in attendance that it is almost impossible to exaggerate its significance as a diagnostic symptom of much value. The tertiary manifestations are not so definite in their appearance. They may present themselves in a few years, or be deferred for forty or fifty years. In vigorous constitutions they may never occur. When present they are of a much severer kind than secondaries. The cutaneous manifestations are generally of the tubercular order; they are prone to ulcerate. When condylomata appear on the mucous membranes, ulceration is very apt to extend to the deeper tissues. When an internal organ is attacked it becomes a very serious matter. The liver, kidney and brain are the most likely ones to suffer. Within their structure and in the meshes of the connective tissue, deposits may be seen, which gradually enlarge and perhaps coalesce. They may completely transpose the organ in which they are embedded. These deposits are known as gummata. In themselves they are not grave as we see when they are located in the subcutaneous and intermuscular areolar tissues. It is only when they attack an important organ that they become serious.

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To be as brief as possible, not a single tissue of the body escapes this poison, and there is nothing peculiar in this when we consider that syphilis is due to a most virulent poison in the blood, possessing the power of multiplying itself. Affections of the eyes (iritis and retinitis) are regarded as intermediary manifestations. They are quite common in the secondary stage of the disease.

Its invasion upon the nervous system is oftentimes very disastrous; paralyses are of frequent occurrence, such as hemiplegia, paraplegia and paralysis of special nerves, varying, of course, according to the nature and location of the lesion. It is of the greatest importance to be able to diagnose the existence of the syphilitic diathesis when the nervous system is attacked, for oftentimes by specific medication we are able to overcome the effects of the poison and restore our patient to society. This can only be accomplished by paying particular attention to the past and present symptoms; indeed, in these cases, the antecedents of our patient are of primary importance. There is no doubt that a large percentage of nervous diseases is due to syphilis, acquired or inherited, and the subject, as you are aware, is receiving much attention from neurologists at the present time.

Unfortunately the disease in its acquired form does not expend its whole force upon the individual who is unfortunate enough to get it. It is apt, yes, very apt, to be transmitted to his offspring. This is most likely to occur if the party marries soon after suffering from constitutional symptoms. No one should be allowed to marry for at least two years after the last manifestation of the disease. The earlier children are more likely to suffer from it than the later ones. Either parent is capable of transmitting the disease to its offspring. The hereditary symptoms may be present at birth, but usually not until the child is two or three weeks old. It then gradually wastes away, snuffles appear, with perhaps eruptions on the skin, but more surely condylomata at the arms. If a child escapes until it is three months old without exhibiting any of these symptoms it is not likely to be tainted with the disease. As the child (if it lives) grows up, that peculiar syphilitic face

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is apt to be developed, with its sunken nose, projecting forehead, asymmetry of skull, thickened bones and enlarged joints. The permanent teeth are said to be very characteristic. Abortions are very common in syphilitic women. Frequently when the disease is in the man the fecundity of the sperms is destroyed. A prolonged course of suitable remedies will oftentimes correct these abnormalities. Probably all secretions of a syphilitic person, provided the disease is active and not latent, may be the medium of transmitting it. A wife may become syphilitic without going through the regular form of the disease—thus, it may be communicated to her through a fœtus in utero begotten from a syphilitic father. I have no doubt that wives sometimes become diseased even when there has been no conception; the frequent and continued lodgment of tainted semen by some means contaminates their blood without causing any local lesion. It is probable that this form of the disease is oftentimes unrecognized, owing to the fact before mentioned, that a chancre is not formed and the secondary manifestations are usually so slight as to preclude suspicion. The advancements of the disease are so subtle and insidious that a diagnosis is oftentimes not made until the patient presents all the advanced features of the cachexia peculiar to syphilis, or is afflicted with some organic tertiary lesion.

The diagnosis of syphilis is comparatively easy, especially the earlier manifestations. The advanced and hereditary forms are oftentimes very perplexing. The obstacles to a correct diagnosis are many. I shall mention a few of them, though I feel it is quite superfluous to do so. The most prominent obstacle is the wonderful powers of mimicry which syphilis possesses.

There are so many diseases which it can imitate with marvelous precision. So impressed am I with this feature that in all cases presenting irregular and anomalous symptoms I ask myself the question: "Is my patient suffering from one or other of the vagaries of syphilis?" There is something wonderfully subtle and cunning in the manner advanced syphilis expresses itself.

Another possible cause of error is in the physician think-

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ing too well of his patient or attaching too much importance to his social status. A good example of such blundering occurred not many years ago in London. (I will not vouch for the truthfulness of this). It occurred in the practice of a very eminent physician of that city. The patient was an illustrious bishop of the established church, and his disease was an inveterate skin affection which resisted every treatment. Hebra, the famous Viennese dermatologist, happened to be a guest in the city at the time, and he was called in consultation He immediately recognized the eruption as syphilide, and expressed his opinion as such to the attending physician, who upon hearing it, was much nettled at Hebra for supposing that so good a divine as the bishop of ——— could be a syphilitic; and seriously asked him if he was aware of the exalted position of this illustrious patient. The astute Austrian simply, but significantly replied in broken English: "Ah, doctor, you must remember that de beeshob vos vonce a young man." I scarcely need tell you that under the antisyphiliptic treatment the patient soon got rid of his obstinate skin affection.

It is a notorious fact that very little reliance can be placed on the veracity of patients when anything pertaining to the genital organs is the questioning point. The physician in all cases of doubt, should never content himself with a subjective diagnosis. A few moments ago I stated that syphilis is a great mimic. Let us see what diseases it is capable of imitating. It will affect very closely almost every form of cutaneous disease, from the simple macula to the highly organized tubercle. True, there are certain distinguishing marks of difference between the specific and non-specific eruptions, but comparatively speaking they are of minor significance. Occasionally cancer is imitated to so fine a point that a diagnosis cannot be made without invoking the powers of the microscope. Likewise rheumatism, certain forms of paralysis, and even a neuralgia of a periodical character, if the exacerbations of the disease happen to be nocturnal. It is likewise almost an impossibility to diagnose syphilitic disease of the lungs, kidneys, liver, brain, etc., from those of some other affections

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of these organs unless we fully appreciate the syphilitic diathesis. Convulsions and coma, produced by the pressure of an intra-cranial gumma may very readily be mistaken, the former for a cerebritis or meningitis; the latter for an ordinary sanguineous apoplexy. It would be easy to multiply examples, but why tire you with facts that you are already well cognizant of. The prognosis will, in a great measure, depend upon the vigor of the patient, the activity of the virus, and the treatment adopted. If nothing more be done than what is termed the expectant treatment, the prognosis will be somewhat unfavorable. There are very few constitutions that can effectually resist this powerful and virulent poison. In debilitated, scrofulous, and intemperate persons, the prognosis is rather discouraging. Unfortunately, syphilis frequently occurs in persons who lead irregular and intemperate lives; and it is among this class that we witness the worst forms of the disease.

It may be said that the outlook is not by any means gloomy, nay, it is quite encouraging, in persons who have a fair constitution, are temperate in their habits, and who undergo a suitable and prolonged course of treatment. Much favorable importance should be attached to a long course of medicine; one embracing only a few weeks or a few months' duration is very unsatisfactory and not likely to give the patient much immunity against future outbreaks.

The treatment of syphilis is, upon the whole, very satisfactory. Indeed, if every disease were so amenable to treatment as this one is, medicine would almost rank as one of the fixed sciences. The patient should be placed in the best hygienic condition possible, as this is going to be a struggle for supremacy between two powerful forces—the eliminating forces of man's physical nature against the virus of syphilis. Consequently, our first attention should be directed to the natural scavengers of the body. Among them is the skin, a very silent worker, but nevertheless a most efficient one; and I fear that from the unostentatious manner in which it performs its function, its importance as a purifier of the body is sometimes underrated, neglected or perhaps forgotten. And in this dis-

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ease, in particular, I feel our attention should be specially directed to it, for oftentimes syphilis occurs in individuals who are utterly indifferent to everything that pertains to ordinary cleanliness.

The sores, whether hard or soft, should be freely burnt. Nothing weaker than fuming nitric acid should be used. I have very little faith in the milk and water treatment of cauterizing the parts with lunar caustic. A little water-dressing may be applied to the eschar. It usually heals rapidly and kindly. Some believe that internal specific treatment should commence at once. I certainly cannot see anything unreasonable in this, provided the diagnosis is clear. It is natural to expect that its early use would have a mitigating influence upon the disease. Some, however, maintain that it should not be resorted to until constitutional symptoms appear; they contend that early resort to it does not mitigate the disease, only delays it.

Respecting the medicines employed, they have been many, but by to-day they have dwindled down to two, viz: the preparations of mercury and of iodine. Occasionally we hear of something new turning up, and I think about the latest out is the revival of a once much-honored remedy, the smilax officinalis or sarsaparilla; another is the internal use of the bichromate of potassium. For my own part I am content to wage war upon the enemy with the able assistance that mercury and iodine can give, and am confident that in most instances I shall eventually be able to dictate my own terms of peace, which are oftentimes nothing short of an unconditional surrender. There is no doubt that mercury is more suitable for the earlier manifestations and iodine for the advanced. A combination of both is perhaps preferable.

As you are aware, secondary syphilis runs a course similar to the exanthemata, only that it is a more prolonged one—extending sometimes over a period of two years. It is questionable whether any medicine can cut short this stage. Mercury certainly moderates and keeps it in abeyance. The admirers of mercury tell us that more than this can be accomplished by it, and you know how fond they are of direct-

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ing our attention to the rapid manner it clears out an iritis. It is true that it accomplishes this in a very short time; but may not this power which it exhibits be due to its controlling influence upon the inflammation and not upon the virus? We all know that mercury is a very potent remedy in inflammation. Mercury may be administered hypodermically, by inunction, fumigation and per vias naturales. The hypodermic method is painful, the punctures are apt to inflame and slough. I don't think it is destined to become a popular method.

In France, however, it is carried on quite extensively. Injections of ammonia-mercuric peptone or an albuminate of the metal are used. M. Luton uses metallic mercury. He injects five or six drops of it into the substance of muscles—the acidity of these structures ensuring its absorption. The advocates of these preparations of mercury claim that there is no sloughing of the punctures and no dread of salivation, as the drugs employed are rapidly excreted by the kidneys. In my humble opinion this is the worst feature of the treatment, and the most undesirable circumstance that can happen to it. It should be our wish to have the drug remain in the system as long as possible. It is there and not in the pot de chambre that it can grapple with the disease.

Inunction is a dirty treatment, even when the aesthetic oleate is used. It is more applicable to infantile syphilis.

Fumigation is cleanly but oftentimes inconvenient. It is very serviceable in obstinate skin affections. Hydrargyrism is scarcely ever known to arise from this method. As it is the mildest way of administering mercury it is very suitable for weakly persons and for those who are peculiarly susceptible to the influence of mercury. Administration by the mouth is nature's way and, therefore, the best. The safest preparations to use are the bichloride and biniodide.

We must guard against mercurialism by mouth-washes of potassium chlorate. The preparations of iodine, and notably the iodide of potassium, are frequently extremely useful in the earlier stages, especially if our patient is broken down in health or scrofulous. Potassium iodide should always be given with a bitter, freely diluted with water and administered upon a full

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stomach. It is in the tertiary manifestations, however, that potassium iodide is most efficacious. Indeed, to use a vulgar expression, I am completely carried away with its charming and almost magical effect. It should be administered in large doses—never less than ten grains. There is no doubt that ammonia enhances its action—hence it is advisable to combine them. It what manner ammonia has this effect I cannot say; perhaps it is by its stimulating action upon the circulutory and lymphatic systems. Some say we should be very guarded in using this drug when any of the structures which make up the nasal passages are involved, owing to its physiological effect upon these parts. I have never witnessed any difficulty. True, some persons are from some peculiar idiosyncrasy very liable to iodism, but this can be overcome by reducing the dose and gradually increasing it when a tolerance of the drug has been established. We are advised by some to double, treble and even quadruple the dose when iodism is rampant. A more illogical, unscientific and almost impracticable advice than this I cannot conceive.

Specific medication should be kept up for a long time—the longer the better. Two or three years would not be too long with an occasional break of two or three weeks' duration. It is probably advisable to resort to an occasional moderate medication in after years, even if there be no evidence of existing disease. A syphilitic usually thrives and fattens under its benign influence. Arabian physicians are said to cure this disease by starving their patients, and after a certain degree of weakness has been reached a resort is made to a quick blood-producing diet.

I have often thought, but never ventured to express, that if transfusion of blood could be rendered more practicable and less dangerous, frequent bleedings followed by transfusion of healthy blood would at least be a cheap if not a desirable method of cure.

A few words on prophylaxis and I shall cease tormenting you: As prostitution is an unavoidable evil, if not a necessary one, and as it is the direct source of syphilis, it would be well if every State enforced some legal method of inspecting all

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houses of ill-fame and suspended every female from carrying on her disgusting craft when found to be diseased. That such a law has some virtue in it we have only to look at Belgium and some towns in England where the Contagious Diseases Act is in force. In the latter places the disease has diminished to less than one-half. Every person who has knowingly infected another should be severely punished. Care should be taken that utensils such as towels, drinking cups, etc., should be thoroughly cleansed after use. The greatest scrutiny should be displayed in the choice of vaccine-virus and also in the now popular remedy—skin-grafting.

A very interesting case occurred in Paris a few months ago, where a large ulcer was covered with grafts taken from the patient's son who was syphilitic. This operation was the means of transmitting the disease to the parent; and the unfortunate occurance should teach us that there is no worthier subject to take grafts from than the person of the patient to be operated on. Physicians should be careful when attending syphilitic women that there are no abrasions on their fingers or hands. It would be well, even if there be no breach of skin, to insinuate a little soap between the nail and matrix of the examining finger in all suspicious confinements.

Great care should be taken in the selection of wet-nurses. A thorough inspection should be made of the nipples, skin, throat, gentials and lymphatic glands. On the other hand a nurse called to suckle a syphilitic infant should be informed of the existing disease and the dangers she exposes hereself to. The prophylactic treatment of syphilization as practised by Boeck, is scarcely worthy of a remark. Its staunchest advocate admits that the method is not always successful and I believe he is rapidly losing confidence in its protective virtues.

Before concluding let me say that on looking over these pages I am much worried by the profusion of dogmatism and egotism which apparently run through this whole article. It is true I have endeavored to refrain from such as far as circumstances would permit, but it is almost impossible to prevent a semblance to them. Should the essay appear to be charged to an unpalatable degree with this too-common fault I shall have at least one thing left to my benefit—my ungainly remarks will invite your criticism.

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CHOLELITHIASIS.

DR. E. C. WAGNER, WILKES-BARRE, PA.,

READ JUNE 1, 1898.

Mr. President and Members of the Luzerne County Medical Society:

I have chosen the subject of cholelithiasis, not because I have had much experience, not that I can offer anything new, but because it has been a subject of vital interest to me, markedly vital, as the patient I operated upon died and the tongue lashings I received from Mrs. Grundy, et ceteris, were *almost* vital. As it is a subject of great magnitude, I shall but briefly skim over the matter and try to give you a picture of cholelithiasis as it stands to day. Gall stones were first observed by Keulmann in 1655 and but little attention was given them until about fifty years ago. They are usually found in patients over forty.

In 395 cases Hein found but three (about 1%) before the fortieth year. In 230 cases Durand Fardel but two.

In rare cases they have been found in the unborn and in new born children.

1. They have a predilection for *females* who suffer in the proportion of three to five women to one man. Stein in his 620 cases found 61%. Durand Fardel in his 230 also 61% in women. Why the female sex should be predisposed can perhaps be partly explained by their sedentary habits and the use of the corset. Bollinger, Bother, Schloth and Marchand found in forty per cent. of female cases of cholelithiasis, also constricted livers. Pregnancy, menstrual and menopausal periods seem to exert some influence. Other predisposing causes are:

2. *Sedentary habits.* 'Tis true prisioners, scientists, etc., suffer in greater proportion than more active people, but this fact is again contradicted by the almost immunity of sailors, which Budd attributes to their being so much in the open air. There must be something in this, for sailors as a rule do like their grog and grog predisposes.

3. *High living*, excessive use of meats, highly seasoned food,

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alcoholic beverages. There is no doubt that cholelithiasis in most cases goes hand in hand with rheumatism, gout (2%), nephrolithiasis 6% (Kraus), lithaemia, obesity, diabetes 4-7% (Kraus), etc., but there are many cases which do not fall under the head of diathetic disorders and still suffer from gall stones.

4. *Heredity* to a certain extent.

5. *Local and climatic influences.* It seems to be more common in nothern climates, and in fact in the tropics where liver hyperaemias, abscesses, etc., are common—gall stones are almost unknown. That the ingestion of great quantities of fat produces this condition is doubtfnl, as in extreme northern countries, e. g. Finland, where fat and oil are the sine qua non, cholelithiasis is the exception. It seems that in certain parts or districts of different countries more cases are found than in others, e. g. the Clinic of the University of Goettingen usually has a number of gall stone cases on hand. The statement that this is due to the water is not proved.

6. *Cancer* of the liver and stomach are said to predispose, but only, I believe, in so far as they prevent the proper functions of the liver cause changes in the bile ducts and prevent the escape of bile. Vice versa it is very likely true that gall stones by their irritation may cause cancer of the liver.

7. Sometimes foreign bodies; seeds, parasites, ascarides lumbricoides, blood clots, degenerated epithelium, etc., may be the nuclei of these biliary concretions.

Beneski found calc. degeneration of arteries often in conjunction with gall stones.

Physical characters. They vary in size from that of a sand grain to that of a small orange, depending for their shape upon the container. Meckel describes one 4¾ x 6 inches. Biliary gravel and biliary calculi must be differentiated—they may exist at the same time—the former being of a fine sandy green, brown or even whitish color, sometimes looking like inspissated bile, at other times showing the characteristics of large gall stones. The more calculi, the smaller they are, naturally those of the gall bladder being larger than those of the intrahepatic ducts. They may be found any where in the biliary channel system.

Number. They number from one up into the thousands, the

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average being ten to fifteen. In my case there were nineteen. Chopart describes a case in which the intrahepatic ducts were so filled with calculi that a scalpel could hardly penetrate the liver. Elsner (Med. News, Feb. 5, 1898,) found 601 in the gall bladder. Otto mentions a case in which the necropsy revealed 7,802.

Form. In the intrahepatic ducts they are usually cylindrical, often with lateral ramifications, sometimes cone like. In the gall bladder they are sometimes round, sometimes long, pear-like, nutmeg shaped, tetrahedral, octahedral, articulated, mulberry formed, many cornered, depending upon their number.

Color. Black, green, yellow, brown, "rotten stone" colored. Cholesterin stones (pure) look like alabaster, those containing much lime, chalky. The more bile pigment—the more color.

Consistency. When fresh they can usually be crushed between the fingers and have a peculiar oily or soapy feeling (like the blood in cholaemic cases.) When broken the appearance of the fragments depends upon their chemical composition. Cholesterin fragments have a crystalline radiating appearance; in the bilirubin-lime variety the surface is very irregular, oftentimes having concentric layers.

Weight. Depends upon their composition and size. Dr. Stead (Br. Med. Journal) mentions one weighing twenty grams; Von Frerichs one 120 and Ritter one 135 grams.

Sp. Gravity. When fresh from over 1000 to 1580 (Bley) and 1966 (Batillat). Upon section we find either a homogenous or a composite appearance, the latter often showing a concentric arrangement of the different layers.

(1) The internal or nuclear; nucleus being mucus, epithelium, foreign body [plum seed—(Von Frerichs)—pins, clots, ascarides lumbricoides]. There may be several nuclei.

(2) A lighter colored layer and cholesterin.

(3) A cortical, darker and harder layer composed of bilirubin, bilirubin-lime.

Chemical Composition. (1) Pure cholesterin, transparent, crystalline and upon breaking them the fragments look like pieces of camphor, marble or asbestos.

(2) Cholesterin pigment, most common, composed of concen-

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tric layers with centrally the cholesterin and peripherally bilirubin, calcium-bilirubin.

(3) Pure pigment more rare, very friable and vary in color from a reddish brown to a verv dark green.

(4) Pure calcium, calc. carb., white or grey and very hard.

Bile stones are then composed of cholesterin; biliary coloring matters, especially bilirubin and calcium-bilirubin; biliary acids; fatty acids; mucin; epithelium; calcium carb., phosphate or sulphate; magnesium sulphate or carb.; traces of iron, manganese, copper. According to Chittenden the largest amount of cholesterin found was 98%. Cholesterin is found throughout the tissues of the body, some in the liver; but the cholesterin stones are not formed from the traces of cholesterin in the liver but from that of the whole body, the bile being evidently the best adapted to keep it in solution and the biliary system being the one by which this waste product, cholesterin, is excreted from the body. In the hepatic bile cholesterin varies from .04 to 0.1%, in the gall bladder bile we find it up to 1% (Chittenden).

" Birds of a feather, etc," is true in the majority of cases of cholelithiasis. In a given case, the calculi are usually of the same consistency and the same chemical composition.

The gall bladder may be so completely filled with stones that there is no place for the bile; in other cases we have, in addition to the concretions, a mucoid or puriform liquid indicative of the catarrhal condition of the mucosa; still in others there is present a limy or mortar-like substance in which the stones are imbedded.

Changes in the Walls of the Gall Bladder. Natural fossae are deepened, diverticula are formed, fatty or calcareous degeneration may be found—the muscle may become hypertrophied or atrophied—the mucosa may be the seat of catarrhal or ulcerative inflammation.

The intra-hepatic ducts often are found dilated, the same catarrhal inflammation as found in bladder may exist in the ducts—diverticula are formed—the ducts may become strictured, encapsulation may ensue. The liver parenchyma is often

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times the seat of abscesses, scars; the portal vein may become inflamed, etc.

Causation of Cholelithiasis. This is uncertain. The theory of inspissation has been abandoned. The chemical theory upheld especially by Thudicum and Bouchard is also very likely in the same predicament. They claim that the mucus exerts upon the bile, especially the biliary acid salts, a precipitating influence. The biliary acid salts in the healthy bile keep in solution bilirubin and cholesterin. Now if a change takes place in the bile, there is a tendency to precipitate these. Calc. carb. also seems to originate from the precipitation, but Von Frerichs seems to think that calc. carb., under certain conditions, is the product of the inflamed mucosa. (Observation of calculi in the glands of the mucosa, salivary calculi.) Hence a diminution of the biliary acid salts according to this theory would increase the cholesterin lime salts and pigments.

According to Dochmann (Wiener Med. Presse 31, 32) the formation of gall stones depends upon a chemical alteration of the bile, diminution of the sodium salts and increase of the calcium, accompanied by increased viscidty. The chemical theory is opposed by Naunyn; he holds that the proportion of cholesterin does not vary. The chemico-anatomical theory is still but a theory.

In Berlin, in 1891, I met and worked in Leyden's Clinic with Mr. Klemperer, the brother of Prof. Leyden's assistant. He was assistant at Naunyn's clinic in Strassburg and told me that Naunyn had adopted the anatomical theory, i. e. Cholelithiasis was due to a special catarrhal condition of the biliary system. This theory by the way is the one now generally accepted. Why this catarrh should exist, whether it is simply an extension from the duodenum or whether bacteriology is to clear up the matter, is still a discovery of the future. Bacteria have been found in the bile ducts, that is certain, even typhoid, but these may have come from the duodenum. In some cases of typhoid fever, symptoms of cholelithiasis have been observed, whether due to typhoid bacilli or whether due to peristalsis of duct and gall bladder resulting from the intestinal lesions is not known.

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Naunyn (in the Deutch. Med. Wochenschrift, April, '91,) advanced that there was a degeneration of the lining epithelium of the gall bladder; this degenerated detritus (containing lime salts, cryst. cholesterin and bilirubin) formed the nuclei of the stones.

J. Mayer, of Karlsbad, (Virchow's Archiv. 1894) after many experiments on dogs, believes cholelithiasis to be due to an unhealthy condition of the mucosa.

Dujardin-Beaumetz holds that biliary stasis and desquamative angiocholitis are important causes of gall stones.

Symptoms. "Attacks of severe pains in the epigastrium and right hypochondrium, accompanied by vomiting and shivering and followed by sweating, complete relief and transient jaundice, are due to the passage of a gall stone from the gall bladder through the ducts into the duodenum; careful washing of faeces will rarely fail to discover the stone or stones in such a case (Rutherford Morison). Sometimes, yes very frequently, there are no symptoms and still the post mortem shows their presence. In the Colney Hatch Asylum for the Insane in fifty consecutive necropsies of females, eighteen cases showed gall stones. During life there had not been any symptoms. (Beadles Journal of Mental Science, London, July, 1891.)

(a) Colic. Only in cases of ambulatory stones, which find it difficult or impossible to pass the ducts. These wanderings may be due to nerve influences, psychical emotions, riding, dancing, jolting or exertion. The pain usually comes on sometime after a heavy meal. It is of a lancinating, sharp, burning or boring character, radiating either into the right thigh, testicle, back, right shoulder or arm, or sometimes into the left arm. The patient's appearance is that of great pain or terrible agonizing distress. In many cases there are no hepatic symptoms whatsoever. Gastralgia, drowsiness, epigastric distress or discomfort taking the place of colic. Dr. Peabody of New York, saw a woman who at intervals could take no ordinary food without low fever and pain. She always obtained relief after the passage of a large gall stone. In others we have a slight conjunctival icterus and great tenderness in the right hypo-

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gastric region. In Fuerbringer's cases colic was absent in thirty-one of forty-one cases.

(b) Tenderness in hepatic region—in itself not pathognomonic.

(c) Chills: Belong to the typical picture but are often absent.

(d) Temperature: May run up to 104° or remain normal or even subnormal.

(e) Pulse: Sometimes fast, sometimes slow, depends largely upon inflammatory changes, antointoxication or nerve influence.

(f) Vomiting: May or may not be present. Pain in the liver region and vomiting, followed by obstructive symptoms, usually mean obstruction by gall stones.

(g) Singultus—not necessarily.

(h) Hysteria: hystero-epilepsy.

(i) Icterus often—never present at the beginning of an attack. If we have icterus we certainly have some obstruction in the biliary channels, be this due to gall stones, cancer, pressure of neighboring diseased organs or cholangitis, etc.

(j) Tumor in the right hypochondriac region. This may be due to the enlarged gall bladder. Sometimes but rarely the stone or stones can be distinctly felt and heard by stethescope (J. L. Petit) as was the case in one of my patients. Of course this does not agree with Dr. Abbe of New York, who thinks that "such preception is a physical impossibility." Whittaker punctured the tumor mass (not to be imitated) with an aspirating needle and made the diagnosis of gall stones by feeling the needle grate against the calculi.

Complications. (a) In the aged encephalorrhagia.

(b) The heart may become affected as stated by Galliard (Med. Moderne 1894, No. 102.)

"(1) During colic reflexly—contraction of pulmonary artery, increased blood pressure, distention of right heart reflexly, dyspnoea, threatened asphyxia, irregular pulse.

(2) Toxic brachycardia—(biliary) (cholaemic.)

(3) Endocarditis, myo or pericarditis due to migration of parasites or transmission of their products from gall bladder. A case of ulcerative endocarditis following cholelithiasis is reported by C. B. Storrs of Detroit, Mich."

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(c) If the gall stones become impacted into especially the common duct we have symptoms of obstruction: Icterus, enlarged liver, later on a decrease in the size of the same—cholaemia—death.

(d) If cystic duct becomes obstructed we have a hydrops cystidis fellae.

(e) In case of rupture of ducts into abdominal cavity we have collapse symptoms, peritonitis, etc.

Aufrecht says that the rupture usually occurs at the end of the ductus communis choledochus or just near the beginning of the cystic duct. In cases of inflammation, which may or may not show itself clinically, adhesions often form with adjacent organs and thus the stones rupture into them; thus into the duodenum, stomach (vomiting of gall stones), transverse colon etc.

If the gall stones are larger than 1 ctm. they can not (I will not say possibly, for the duct may dilate considerably) probably pass the ducts.

Rupture into the pelvis of the kidney has been observed. Elsner (Med. News, February 5, '98), reports a case of cholelithiasis and consequently the same case had symptoms referable to the right kidney. The necropsy showed a fistulous tract from the gall bladder to an abscess in the right kidney and an enormous gall stone in the pelvis of the same.

Rupture may occur into the bladder, very likely through a patulous urachus. Barraud-Palletan had a female patient, age thirty-seven, pass 200 gall stones per urethram in eight days. Güterbock had to make use of lithotrite to crush gall stones in the bladder. Davidson of Sydney (Australasian Med. Gaz. October 15, '97), reports a case of a woman who passed gall stones through the umbilicus. From the intrahepatic ducts they may rupture through diaphragm, lungs, bronchi (Draschfeld's case), into portal vein. The abdominal walls may become agglutinated to the gall bladder and rupture may take place through them. Whilst at Leipsic I had occasion to see a case of this kind. Of course a local peritonitis must precede, and this very likely accounts for gall stones breaking through at different parts of the abdomen, umbilicus, above Pouparts, etc.

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Usually after a gall stone has successfully passed, no matter how, into the bowel the danger is over—but not always—the danger of intestinal obstruction still exists as in the case of Mrs. Oberrender—the necropsy showing this to have been the case. This was kindly related to me by Dr. Fell.

Thiroloix (Bull. de la Soc. Anatom. Paris) reports a case of intestinal obstruction by a bile concrement 3 x 6 c. (Vesico duodenal perforation.)

In the same journal A. Létiénne mentions another case in a female patient aged seventy-eight. In the Philadelphia County Medical Society, James Collins reports two cases.

Lobstein (Beitrage zur Klinischen Chir. Bd. xii Hft. 22) in speaking of intestinal obstruction due to gall stones mentions two cases and refers to ninety others. Of these, of sixty-one that were not operated upon thirty-two recovered; of the thirty-one operated upon twelve recovered, but nineteen were moribund when section was made. Cases of obstruction due to gall stones are reported also by Everly Taylor of Scarborough; Körte and Arbuthnot Lane; C. H. Miles Kirmisson (Feb. 92, Archiv. gén de méd. Paris) and Rochard (British Medical Journal April 2, '92) analyzed 105 cases with fifty deaths. Guépin (bul. de la Soc. Anat. de Paris) reports a case in a woman seventy-six years of age; tumor mass at hep. flexure of colon. It turned out to be an abscess, and after rupture it discharged a gall stone 3 x 7½ ctm.

Cases have been known where small gall stones found their way into the appendix. Inflammatory adhesions may close up the pylorus as was the case in my patient. Severe hemorrhage (Ord) may be caused by injury to the hepatic duct in the passage of gall stones. Calculi are a frequent cause of abscesses, as reported by McConnell in Montreal Med.J ournal, Dec., '91. Also by Herrick, Steel, A. Frankel, etc. Perhaps cirrhosis and cancer may be caused by their irritation. The disease may last for years or the first attack may be fatal.

Differential Diagnosis. Cholelithiasis must be differentiated from:

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(1) Colic. In ordinary colic we usually have flatulence and the pains usually decrease on pressure.

(2) Hepatic neuralgia. Treatment for gall stones unavailing. The neuralgia is apt to occur or interchange with neuralgia of other parts of the body. Fürbringer (Wiener Med. Wochenscrift) reports four cases of hepatic neuralgia, in which the diagnosis of cholelithiasis had been made and small facetulated bodies were passed that resembled gall stones. But they contained no bile and proved to be concretions due to eating pears.

(3) Lead Colic. Blue lines on the gums and history of case.

(4) Gastralgia. Pain chiefly in stomach, history of indigestion, fever not so frequent, pressure rather relieves than increases pain, usually no icterus, relief by belching.

(5) Appendicitis. The history of the case may help us, but we may be led astray when the appendix is situated under the liver, but usually the appendix is found at or near McBurney's point.

(6) Nephrolithiasis. Pain especially in the kidney region, gravel in urine, haematuria perhaps.

(7) Floating Kidney. Usually palpation will clear up the matter. Eichhorst mentions a case of a lady who, after her first confinement, was taken with severe pains in the liver region. There was icterus. He discovered the floating kidney under the liver and the future course of the trouble proved it to be a floating kidney pressing upon the bile duct.

(8) Enlarged right Kidney. (When enlarged the gall bladder rests upon it. The two organs move together under ordinary examination, and the enlarged kidney may simulate an enlarged gall bladder. By trying to move the one or the other independently the diagnosis is cleared up. This was illustrated by a case of cholecystotomy in the hands of Dr. J. W. Taylor (Birmingham Med. Review, Mch., '92).

(9) Volvulus, Intussusception. Vomiting, especially later on foecal, obstipation. Especially when icterus is present, watch out for obstruction of the bowels due to gall stones.

(10) Aneurism of the coeliac axis or abdominal aorta. Bruit clears up the case.

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(11) Intermittent fever. Especially in cholelithiasis when the pain is very slight and we daily have chills and fever. Quinine clears up the diagnosis.

(12) Poisoning. Especially from rapidly fatal cases of gall stones.

(13) Psoas abscess. In exceptional cases where gall stone obstruction exists in ileo-coecal, sigmoid flex. region, etc.

(14) Gastric or Duodenal Ulcer. Abnormal amount of acid in favor of ulcer.

(15) Ovarian cyst in case of large distention of gall bladder. Diagnosis must be made by shape of tumor, its moving up and down with liver upon inspiration and expiration—vaginal or rectal examination.

(16) Cholera. Yellow Fever. Especially in cases of cholelithiasis with colliquative diarrhoea. The presence of cholera or yellow fever would naturally put us on our guard; also other symptoms.

Prognosis. Usually good, but is always policy to abstain from an absolutely favorable prognosis, as the first attack has been fatal. Perforations are more frequent than supposed. Elsner found nineteen in 421 cases. Still we should never be pessimistic. Von Frerichs reports a case which recovered after the duct. commun. choledoch. had been obstructed for seven months. The patient recovered at Carlsbad. We can never tell whether or when another attack will occur.

Treatment is threefold.

(a) To treat the attack, ameliorate symptoms.

(b) To remove the gall stones.

(c) To prevent re-formation.

(1) During the attack. Morphia and atropia in large doses; chloral hydrate, Spts. chloroform ℥j in Spts. Aetheris. Comp. Hot applications over liver; hot baths; ether or chloroform narcosis; never emetics.

To Remove the Gall Stones. The anodynes and anti-spasmodics given during the attack favor their passage. Liquid diet. If we think they are in the intestinal canal—some laxative. Large quantities of spring or Carlsbad, Vichi, Seltzers, Contrexeville, Kissingen, Giesshübler, Biliner, Ems, Marien-

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bad, Mountain Valley, Homburg, Hawthorn, etc., waters. Turpentine has its advocates and the Durand remedy (ol. Terebinth .5 0, Aeth. Sulphur. 20, 20 drops four times daily) was in great repute at one time, but that time is passed. Large doses of sodii phosphas are still given or the more elegant Liq. Sod. Phosph. Comp (S. & D.); alkalies; ether and turpentine (the last two dissolve cholesterin in the laboratory) do not act as solvents but as increasing the amount and diluting the bile (Lewaschew). We come now to Ol. Olivarum, once sworn by, but now considered of doubtful efficacy. Kennedy speaks highly of it, so also Senator, of Berlin. In the Buffalo Med. and Surg. Journal Mays gives the result of collective investigation, as to the utility of olive oil, by the Phil. Policlinic Med. Society. He and D. D. Stewart consider cotton seed and olive oil as equal in their treatment of cholelithiasis and believe that their beneficial action is due to lubrication and flushing of the hepatic channels and an increase of bile.

Dujardin-Baumetz (Bul. general de therap., Paris, Sept. 15 and Oct. 15, '91) gives ℥vii ol. oliv. at one time with ℥vss of ox gall, afterwards rinsing the mouth with lemon, orange or brandy water. He, in that article, said about this treatment, "failure constituted the exception." Later on, however, he was not so sanguine. He also advocated Sod. Salicyl. Ol. Oliv. was also recommended by E. Villemin, Goodhart, Égasse, Kelly, Swiderski, Fenn, Davis, Landon, Fisher, Early, G. See, M'Court, of New York, and others. There is no doubt but that Ol. Oliv. has removed some gall stones, but again there is no doubt, that in the majority of cases, the supposed gall stones passed were not gall stones at all but saponified oil colored by bile.

Gubb, Meyer, Kichkine, Ewald are against Ol. Oliv. Burbank found that in healthy persons Ol. Oliv. is followed by the passage of large, dark green or whitish masses of soap and oil.

A great many have advocated Sod. Salicylate and alkalies.

According to W. N. Nissen (Therap. Gazette October 15, '91) alkalies do not act as cholagogues, but as diminishing the flow of bile and exerting a solvent action upon mucosa. He

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advises Carlsbad with Pot. Acet.—others advise podophyllin, euonymin, calomel, purgative waters.

Regarding the use of cholagogues we may well consider the words of Dr. Hoegh in a paper read before the Minn. Acad. Medicine: "Where there has been no icterus, I can see no justification in trying to push the stones through, for they must yet be in the gall bladder or cystic duct and hence they can safely be removed by surgical means. To subject a patient with stones confined to the gall bladder to the risk of having them arrested in the duct. choled. seems almost a criminal act. In fact, the only condition that I think of, that would justify the use of cholagogues, would be that group of cases in which the disease begins suddenly and is complicated with jaundice, without such prodromes as epigastric oppression, occasional cardiac pain or nausea. The absence of these symptoms indicate that the disease was recent and the stones small and that the jaundice was the result of impaction of a small stone, for if it were caused by concomitant inflammation of the duct choled, we ought to have a train of inflammatory symptoms preceeding it."

Puerkhauer (Munich Med. Wochenschrift) advocated a mechanical treatment, dancing, riding, driving, massage, active exercise, continued for hours to loosen the obstruction in the duct. com. choled. This treatment I consider very dangerous as we do not know whether any ulcerative process exists. If it exists the violent exercise may cause sudden perforation.

If a gall stone is larger than 2-5 inch (1 ctm.) it cannot pass the ducts and therapeutic measures will prove futile; hence we must look for other treatment, and surgery offers it to us.

Riedel (Munich Med. Wochenschrift) holds that gall stones small enough to pass the cystic and hepatic ducts should be treated medicinally, and cases in which they cannot do this require surgical intervention. He reports sixteen without jaundice operated upon with sixteen recoveries; of sixteen with jaundice ten recovered after operation without complications. Four died and two were still under treatment. But then we may ask, when and how do we know that calculi are too large to pass the ducts? The answer to this: Frequently

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recurring attacks, no stones in the stools, tumor mass in gall bladder region, jaundice—although the last two are not absolutely necessary, as a gall stone may perform the functions of a ball valve. Czerny (Oestung. Central Blatt für die Med. Wissenschaft December, '92) says: "Operative procedures depend upon the severity of the case, whether internal treatment has proven effective during attacks, whether fever exists, whether icterus is present. Cases in which icterus existed but a short time require ideal cholecystotomy; cases in which it has existed a long time cholecystotomy with drainage; and in cases in which the gall bladder is the seat of purulent inflammation, calcification, cicatricial adhesions, cholecystectomy."

Beaumetz in a lecture on biliary fever states: "Whenever by reason of a calculus or some morbid alteration of the bile duct, there exists an insurmountable obstacle to the overflow of bile and the latter accumulates in the gall bladder and distends it so as to constitute a tumor, which is sometimes mistaken for a hydatid cyst, the duty of the physician is to call in the help of surgery and obtain the definite cure of the patient, and such surgical intervention will be in the great majority of cases followed by success."

Perhaps the best indications for operation are those laid down by Mayo Robson.

"(1) Frequently recurring biliary colic without jaundice.

(2) Persistent jaundice, ushered in by pain, and where recurring pains, with or without ague like paroxysms render it probable that the cause is gall stones in the common duct.

(3) Enlargement of the gall bladder without jaundice, even if unaccompanied by great pain.

(4) Empyema of the gall bladder.

(5) Peritonitis starting in the right hypochondrium.

(6) Abscess around the gall bladder or bile ducts, whether in the liver, under or over it.

(7) In some cases where, although the gall stones may have passed, adhesions remain and prove a source of pain and illness. (Prof. Lennander operated for this condition sucessfully.)

(8) In fistulae, mucous or biliary.

(9) In certain cases of jaundice with distended gall bladder

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dependent upon some obstruction of the common duct, but in such cases the increased risks must be borne in mind, as malignant disease will probably be the cause of the obstruction."

The longer icterus has existed the more dangerous the operation, because of the danger of cholaemic hemorrhage. Calc. chloride in large doses has been highly recommended to be given sometime before the operation.

Operation. Cut down upon the gall bladder; if not adherent lift it out of the peritoneal cavity, pack gauze about, incise, drain off bile, pus or whatever you may find and take out gall stones by means of forceps, scoop, or best of all, with fingers if possible. If the stone be in the cystic duct, try and tease it up by pressing from the outside, from below upwards. If this is not successful, enlarge the vesical inscision and gently try to dislodge it by means of a long slender forceps. If this fails, place gauze about the cystic duct and gently try to crush the calculus or needle it (not now a generally accepted method), if the concrement does not give, then cut down upon and remove it. After this has been done try and suture the duct avoiding the mucosa. The suturing is facilitated by following the plan of Dr. J. Wheelock Elliott, of Boston, he passes his sutures before removing the stone.

If you cannot suture, pack gauze about and under the duct, the incision will close itself and the gauze can be removed in two to four days. In cases in which there is a very tight stricture of the duct, or where there is suspicion of a pathological growth, both the duct and gall bladder should be excised. The gall-bladder peritoneum is in simple cases then stitched to the parietal peritoneum with fine silk, the skin and muscular wound sutured and gall bladder drained. It closes very kindly in most cases. The immediate closure of the gall bladder wound has been successfully done, but must as yet be considered a surgical nicety and rather risky, as often concretions remain behind, sacculated, which will later on become free and if the wound remain open be discharged per fistulam, but if closed we certainly will have another attack of colic.

In cases in which all fragments do not pass, or in which calculi have been left behind, it is wise to wash out (Robson)

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the fistulous tract with a five per cent. solution of Sap. animal. in warm olive oil night and morning.

In cases in which, because of adhesions, the gall bladder cannot be treated extra peritoneally, it becomes necessary to enlarge the abdominal incision, pack gauze about the common duct, omentum, intestines, etc. In these cases I think it would be wise to aspirate the gall bladder first, then seek for calculi along the common cystic duct, and finally to perform cholecystotomy. The after steps are the same as before described, with the exception of those cases, in which the gall bladder cannot be brought up to the parietal peritoneum. In these cases it is wise to follow the plan of Mayo Robson. Strip the peritoneum from the rectus sheath, press it down to the gall bladder and stitch it to peritoneal covering of the latter. If stripping the peritoneum does not shut off the peritoneal cavity entirely, follow Körte's plan, of Berlin, i. e. bring up the omentum and thus fill up any openings that remain. If the common duct is blocked try lithotrity when the calculi are soft, but when hard incise and remove them and suture. Robson uses a single row of sutures, glass drainage tube and gauze packing. Fenger (Amer. Journal Med. Sciences Feb., Mar., '96) reports operative cases, in which the concretions were in the common duct, with one death. He recommends a double suture of the duct, first per mucous and external coats, then per peritoneum of ant. hepatico-duod. ligament.

Some do not suture the duct, but simply pack gauze down and around it. This method has given excellent results in the hands of W. E. B. Davis, Birmingham, Ala. Dr. Davis' experiments on dogs prove conclusively that the peritoneum can take care of small amounts of bile.

After the rubber drainage has been inserted into the gall bladder, it is allowed to remain from seven to ten days, then it ought to be removed and a pad put over the opening. If this pad acts favorably and bile appears in the stools, a very firm pad should be strapped over the fistulous opening, and this will close in three to four weeks. If it remains open, the chances are a calculus is still present. Usually it, or they, as the case

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may be, is expelled, but if after two months the opening does not close, the advisability of re-opening must be considered.

Complications. Complications must be met as they arise. It was my misfortune to have one of those cases in which the pylorus was obstructed by adhesions. Galliard (Presse Med. Oct. 5, '95) speaks of this condition as being very rare. He speaks of adhesions between gall bladder and pylorus; but in my case the adhesions were between right hepatic lobe and pylorus. He explains the pylorus obstructions thus: The pylorus being a fixed point, the gall bladder with calculi drag down upon it and thus by traction cause obstruction. "The adhesions not necessarily have to be adherent to the pylorus, but to the stomach proper, and by contraction the pylorus becomes obstructed, at first partially, later more and more as the stomach dilates." 'Tis here that I should like to make mention of the very interesting case which came into my hands last summer.

Mrs. S. had suffered periodically for twenty-two years from what she called bilious attacks, headache, lassitude, nausea, vomiting, constipation.

She did not make mention of any pain in the liver region until about six months before the operation. When I first examined the patient—a small, thin, flabby, bilious looking woman—she had her usual symptom complex and in addition a severe, constant pain in the right hypochrondriac region; some rise of temperature, no chills, no icterus. The liver was enlarged, extending about an inch below the ribs and a tongue-like projection about three inches long and exquisitely tender to touch was found in the gall bladder region. This I diagnosed as the enlarged gall bladder. However, the swelling disappeared and she got along nicely until March, 1897, when she had another attack similar to the preceding. I told her she had gall stones and advised an operation, which as usual was postponed. I saw her again in June, 1897, together with Dr. A. G. Fell, and we both came to the conclusion that we had a case of cholelithiasis. In fact I was certain I could feel movable bodies and hear crepitation in the tender area. The pain became progressively worse and the patient became drawn toward the right side. On the third of July, '97, she was operated upon by me. Drs. Fell, E. and H. Diefenderfer and Smith assisting. We found the liver hypertrophied and a

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tongue-like projection of the right lobe extending downward about three inches over the gall bladder. But my hard lump, my gall stones, were not to be found. In the tonge-like extension we discovered several softened areas and upon aspiration obtained fifty grams of fluid, at first clear, slightly amber colored, later a thick colloid material which almost refused to be drawn through the aspirating needle. This fluid was highly albuminous, but the microscope revealed nothing in particular. The gall bladder was small, and in its usual position, so also the cystic duct.

It was my intention to go down into the softened areas, but upon consultation the decision was, no. But it should have been done and perhaps my patient to day would still be with us. She recovered nicely from the operation without a rise of temperature. The pulse was slightly accelerated. Appetite good, bowels in splendid condition and dark in color, no vomiting, no chills. However on the tenth day after the operation she complained of headache, on the eleventh she vomited bilious material and continued vomiting at intervals until the twelfth, when the emesis became incessant. Constipation. No food could be retained and nutrient enemata were given. On the twelfth day a tympanitic tumor mass appeared on the left near the umbilicus, but would disappear upon vomiting. This was but for a short time when it became permanent and moved down to about two and one-half inches below the umbilicus. On the thirteenth day she became very weak, temperature normal, pulse from 120 to 135. On the fourteenth day the vomiting became less and she seemed somewhat stronger; the pulse came down to 105. We held several consultations and agreed to wait until the morning of the fifteenth day and if there was no improvement to operate for obstruction of the bowels, which obstruction we diagnosed to be near the stomach. The fifteenth day found her condition worse and coeliotomy was performed. The stomach was extremely dilated, reaching down to the brim of the pelvis, congested as was also the duodenum and part of jejunum. Bowels empty. The pylorus and upper portion of the duodenum were found adherent to the right lobe of the liver and upon separating the adhesions pus flowed out of the liver substance. Here was pus, but no rise of temperature, no chills. Distinct hard masses could be felt and upon making a free opening we with difficulty succeeded in removing nineteen gall stones, each the size of a small hickory-nut, octagonal, regular in appearance, apparently fitting together, greenish gray, soapy, cholesterin-pigment calculi. The abscess cavity led down about four and one-half inches into

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the right lobe. The calculi had evidently been unable to pass the hepatic duct or the beginning of the duct. commun. Choledoch.; peritonitis had set in, and they ulcerated through into the right lobe and there formed an encapsulated abscess. I do not doubt but that the cavity in the liver tongue communicated with this large cavity, as this would explain the disappearance of the calculi and tumor at different times. The abscess cavity was irrigated, sutured as much as we thought proper and a gauze drain put in. The patient rallied from the operation but died four hours afterwards. The pylorus obstruction was of hepatic origin.

The cystic duct was examined, it seemed patulous; the gall bladder was not enlarged; the common duct could not have been obstructed as the patient vomited bile and her stools were biliary after the first operation. There was no icterus, which again refutes the obstruction of the common duct. Hence it must have been in the hepatic or intrahepatic ducts that the trouble originated.

Cases of intestinal obstruction due to gall stones are not uncommon. Lobstein (Beitrage zur Klinischen Chir. Bd xii H. ft. 2) mentions two cases and refers to ninety others. Of these, sixty-one were not operated upon, with thirty-two recoveries. Of the thirty-one operated upon twelve recovered, but nineteen were moribund upon admission. C. H. Miles reports a case in a women seventy-seven years of age, not operated upon, but recovery.

Mr. Everly Taylor, of Scarborough, in a case of obstruction successfully removed a stone weighing ℥i ℈i and two inches long, with a circumference of four and a half inches. Körte and Arbuthnot Lane report successful cases. Kirmisson and Rochard analyzed 105 cases with 50 deaths. Guépin reports an obstructive case in a woman aged seventy-six years, tumor mass at hepatic flexure of colon. It turned out to be an abscess and after rupture it discharged a calculus 3x7½ ctm. Elsner (Med. News Febr. 5, '98) mentions a case of wandering gall stones in a woman fifty-seven years of age. For fifteen months she had a tumor in the right hypochondrium, simulating carcinoma; in addition she had a dilated stomach and retention of its contents, decrease in Hcl., slight enlargement of pylorus. She was seized with horrible cramps and with symptoms of almost complete intestinal obstruction, and

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some idea of section was entertained. Sixteen days later she passed a calculus thirteen ctm. in circumference, weight 240 grains. Eleven months later she passed another weighing 240 grains, and then complete recovery. Dr. G. G. Hopkins, of Brooklyn, the preceptor of my former room-mate, operated upon a female patient aet. forty-eight, successfully, and removed 110 gall stones. Successful operations for cholelithiasis seem to-day rather the rule than the exception.

To recapitulate surgically.

(1) Cholecystotomy, especially advocated by Tait.

(2) Ideal cholecystotomy not advisable.

(3) Cholelithority: When ducts cannot be cleared by manipulation (fingers, padded forceps, needle). Needling, because of injury to ducts, is now given up by a great many surgeons.

(4) Choledochotomy: With mortality of 6.6%—37.8%. Especially in cholesterin calculi, suture (Robson used rectangular cleft palate needle) and pack drainage down into right kidney pouch. If you do not use sutures simply use gauze and glass drainage. According to Abbe: "Raise the shoulder, drop the hips of the patient in order to cause colon and small intestines to fall away. Raise the liver, draw the colon towards the middle line and downwards, pack well with gauze, make incision per peritoneum of posterior wall from cystic duct downward on outer side of duodenum toward the kidney. Through this opening the finger can lift up the first and second part of duodenum and explore the under side of the head of the pancreas and lower part of the common duct." The duct lies on the portal vein and cystic artery to its side.

(5) Cholecystenterostomy: Conceived by Gaston, Harley and Nussbaum; first done by Winiwater in 1880 by means of Murphy button. In cases of non-removable obstruction to the common duct or very much dilated condition of gall bladder. But even in cases of very much dilated gall bladder without obstruction of duct, I personally do not see any reason why the gall bladder should not be abreviated and then stitched to the abdomen. I think I should try it. Murphy gives a record of thirty-eight cases of this operation (Cholecystenterostomy, with one death. Later on he gave statistics

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of twenty-three cases by suture with a mortality of thirty-four per cent.; twenty-one cases by button with no death.

(6) Cholecystectomy (first performed by Langenbach in 1882 and highly advocated by him, as the majority of gall stones are in the bladder) in case of stricture, of the cystic duct or when the gall bladder is very much diseased.

(7) Choledocho-duodenostomy: (So called by Sprengel of Dresden, and performed by him successfully in October, 1891). in cases of stricture of especially the lower third of the common duct.

(8) Choledochostomy, or direct surface drainage of a dilated duct.

Although eighty per cent. of operations have thus far been favorable, still dangers must not be overlooked.

Körte's statistics (though old) may prove interesting.

Cholecystotomy, seventy-eight cases; sixty-eight recoveries; ten deaths; twelve per cent.

Ideal cholecystotomy, ten cases; seven recoveries; three deaths; thirty per cent.

Cholecystotomy, thirty-seven cases; thirty recoveries; seven deaths; eighteen per cent.

Cholecystenterostomy, four cases; four recoveries; no deaths; no per cent.

I feel I have already taken up too much of your valuable time and shall devote but a few minutes to the third section: "To prevent re-formation."

Regular life; abstaining from alcohol; proper exercise; avoiding highly seasoned food; a limited amount of meat and game, sugar, fat, calves' brains, liver, &c.; free use of eggs, green vegetables and acid fruits; plenty of spring water, especially the alkaline for a few months at a time and repeated every two or three years. The special virtue of the alkaline springs consists in their favorable action upon any catarrhal condition present. Lewaschew and Eichorst highly recommend Sod. Salicyl 0.5 t. i. d., to be taken for a long time.

Thanking you for your kind attention to my humble and wearisome attempt, I feel but too honored if I have been successful in adding one small link to the chain of scientific and practical papers that it has been the pleasure of the Luzerne County Medical Society to enjoy.

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BREAD.

BY DR. FREDERIC CORSS, KINGSTON, PA.
READ JUNE 22, 1898.

In venturing to present to this medical society an essay on a subject not strictly technical, the excuse may be offered that the purpose is to extend our special study for the time to the more generalized topics of ethnology and civilization and to emphasize and illustrate a striking feature in the progress of the human race.

The term progress means permanent improvement. In a state of savagery the capture of a large amount of game brings a temporary alleviation of the miseries of savage life but no permanent improvement of the savage condition; but, securing the means for an adequate and continuous supply of materials of subsistence denotes progress. The introduction of life upon the earth was the introduction of an irrepressible conflict, a remorseless struggle for existence. In human life one victory secured does not end the struggle, it merely shifts the ground. Life is manifold in the human being. When the first field of contest, that of bare life, is won, another irrepressible conflict immediately arises. This is the struggle of light with darkness, of truth with error, of vice with virtue. The second half of the nineteenth century is witnessing the sublime efforts to throw off the shackles of slavery of all sorts. Chattel slavery remains only in remote regions. Submission to despotism is no longer unresisted, and government of the people, by the people and for the people is everywhere demanded and will be secured. Coincident with this, but more remote of attainment is the struggle to secure to every man an equality of opportunity. So, I doubt not, the final destiny of mankind will be more glorious than can now be described or conceived.

Thus far in the world's history among and under all the struggles in the ascent of man, one great, dominant and irresistible demand has been always present, obstructing his efforts, barring his progress, diverting his energies and often rendering futile his utmost endeavors for noble achievement. Ad-

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vancement has been everywhere and always dependent upon success in meeting that underlying and ever present demand.

If you take a map of the Eastern hemisphere and draw a line from Calcutta to North Cape, another line from Calcutta to Cape Blanco, and connect the two capes by a third line, the triangle formed will include the scene of all the useful advancement of mankind from the dawn of history to the day when Columbus sailed on his memorable voyage. In the southern portion lies the Mediterranean sea, whose waters have been vexed by contending navies from remotest times. On its waves rocked the frail boats of Jason in search of the Golden Fleece. Here the unfortunate Dido watched the vanishing ships of the Pius Aeneas, and Decatur thrashed the corsairs of Tunis and Tripoli. Among the beautiful islands of the Aegean sailed Agamemnon, king of men, in search of the fair but possibly fickle Helen, and its southern shores lately resounded with the bombardment of Alexandria. The rulers of the Mediterranean were the formost in the marching and advancing ranks of mankind until 1492.

They were not, however, the real autochthones of those lovely and fertile lands which surround the blue Mediterranean. The warriors who founded Alba-Longa and brought the gods to Latium came from the east, but not from without the limits of the great triangle we have described. These peoples, who have recently been classified as a branch of the genus Homo and called Homo Mediterraniensis, bequeathed to modern times an inestimable treasure of art, architecture, literature and jurisprudence, upon which rests, and upon which has arisen all that we possess. The body of Roman laws codified in the Pandects and Code of Justinian was the foundation, the *fons et origo* of modern municipal, national and international law. The earliest poems, the book of Job and Homer's Iliad, were the initiative of the best of modern literature, and the grandure of the Hebrew sacred writings lends itself to adorn and strengthen and vitalize the best of modern intellectual productions, while the highest praise which can be conferred upon a modern work of art is that it approaches the work of Praxiteles and architecture pays its tribute of praise in

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reproducing the proportions of the Pantheon and the Colosseum.

While the variety *Homo Mediterraniensis* accomplished all this and developed the esthetic qualities of man, it failed to a certain degree in meeting and satisfying that omnipresent demand referred to above. There arose another and stronger and more virile type which unconsciously but irresistibly called for a better provision for the satisfaction of that demand. The men from the North Sea began to appear upon the scene and opened a new chapter in the annals of mankind.

The North Sea lies in the northern portion of the great triangle inscribed upon the map. Its stormy waters are frozen by severe winters and the less fertile shores call for more exertion in the battle for existence. These peoples acquired more physical vigor in that struggle than was possessed by the esthetic and intellectual denizens of the Mediterranean lands and contending with adverse forces of nature taught them the art of war and conquest. The Vikings and the Goths having for centuries seen the legions of Cæsar and his successors holding sway over Gaul and Britain began to encroach upon their possessions and ere long descended with overwhelming force upon the shores of the Mediterranean, and Rome fell. Great Britain, Germany and France slowly arose and became the dominant races in the triangle. War with its horrors became the origin of modern national existence, and now in our day, indeed within our own memory, a new power arises from the Northeast which by meeting the great demand of the human family, bids fair to initiate a new, and therefore unknown element into modern social, industrial and national life.

The rise of the Slav is no figment of the imagination inspired by fear and fostered by professional alarmists. A despotism organized to rule and restrained by no scruples, managed by tyrannical officials and possessing money, territory and subjects accustomed to subservience is the best example extant of the unified national life. But the crucial test is in their ability to meet the demand of the dominant race, or rather their ability to meet the racial demand constituting them the coming dominant race.

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Such is a very brief and fragmentary syllabus of the history of the peoples within the limits of the great triangle. The prominence of America, Australia and Japan in the world's history is more recent than the voyage of Columbus and as may be shown further on in this essay illustrates for modern times the theme which is proposed in regard to the ancient and mediaeval world.

Our supposed great triangle presents a great variety of natural features and of climates. In India, Egypt and the Barbary States we find a semi-tropical temperature. In Central Europe the temperate zone, with its warm summer and relatively mild winter, predominates. In the North we find almost Arctic winters and short but warm summers. Thus it appears that the dominance of the successive peoples is not attributable to climate. The Egyptian supremacy of the earliest historical period was in a region where winter is comparatively unknown. The Assyrian and Babylonian periods were in regions of similar climatic conditions. The Roman period was in more temperate regions, as have been the present eminence of German, French and British nations. The coming dominance of the Slavish people will be an illustration of a controlling power in regions where winters are severe and climatic conditions apparently unfavorable to great national growth.

Again, the physical conditions found in our supposed triangle are almost infinitely varied. Rugged mountains have not prevented the Swiss from being a great people, nor have the plains of Egypt sufficed to keep the power of Egyptian races from decay. Man's pre-eminence in nature is nowhere seen more marked than is his power of adaption to varied environments. Has not that delightful Frenchman, Paul du Chaillu, taught us to hunt the gorilla as well as to shiver in the icy breezes of the land of the midnight sun? The English soldier is efficient both in Canada and Alaska, and on the coral strand of India, and among the howling Dervishes about Khartum. So we must conclude that the successive supremacy of different peoples in the triangle cannot be attributed to physical conditions.

The various historical events which I have briefly referred

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to are quite generally attributed to supposed superiority of the peoples arising from a racial excellence far surpassing the characteristics of other branches of the human family. This opinion is based upon the scientific fact that racial characteristics are remarkably persistent, and that the successive peoples referred to, all belong to the Aryan race. The suggestion that a primitive Aryan race gave origin to the modern dominant nations was founded on philological studies of so-called Indo-European languages, and on the assumption that kinship in speech implies kinship in blood. Then we are led at once into the heart of the Aryan questiou, and if the supposition and assumption are both true we have arrived at an answer to the historical question, "On what is dominance based?" I shall make an extended quotation from Prof. Huxley's essay on the Aryan question:

"About a century ago Sir William Jones pointed out the close alliance of chief European languages with Sanskrit and its derivative dialects now spoken in India. Brilliant and laborious philologists, in long succession, enlarged and strengthened their position until the truth that Sanskrit, Zend, Armenian, Greek, Latin, Lithuanian, Slavonian, German, Celtic, and so on, seemed to one another in the relation of descendants from a common stock became firmly established, and thenceforward formed part the permanent acquisition of science. Moreover, the term 'Aryan' is very generally, if not universally, accepted as a name for the group of languages thus allied. Hence, when one speaks of Aryan languages no hypothetical assumptions are involved. It is a matter of fact that such languages exist, that they present certain substantial and formal relations, and that convention sanctions the name applied to them. But the close connection of these widely differentiated languages remains altogether inexplicable, unless it is admitted that they are modifications of an original relatively undifferentiated tongue; just as the intimate affinities of the romance languages of French, Italian, Spanish and the rest, would be incomprehensible if there were no Latin."

The essayist proceeds to show that although the primitive Aryan language no longer exists we have abundant evidence

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of its characteristics while the geographical location of the people using it is unknown. But the point which has a direct bearing upon the present discussion is, did these dominant Aryan peoples arise from an original, distinct Aryan race, having persistent race characteristics of a superior order? And Prof. Huxley continues:

"Any biologist who studies the history of the Aryan question, and, having taken the philological facts on trust, regards it exclusively from the point of view of anthropology, will observe that very early the purely biological question of the race illegitimately mixed itself up with the idea derived from pure philology."

The essayist then proceeds to show that just as the speakers of romance language do not constitute a distinct romance race, but, on the other hand, differ widely in a biological view, so there is no distinct Aryan race, but that Aryan peoples consist of widely divergent biological types, which, by contiguity and intercourse, have become assimilated in speech without losing their distinctive biological differences. Then it becomes evident that the dominant races have not acquired dominance from persistent racial superiority.

Thus by a process of exclusion we conclude that the historical dominant nations have obtained their position not from climate, nor from geographical topography, nor from persistent race element, and we are brought back to the original theme that there has been ever present a great, insatiable demand of the human family, and that the dominant nation, for the time being, has always been that people who could best meet that demand. A demand so universal is of necessity in the bald statement extremely commonplace; in short, it is a demand for food.

More clearly stated the proposition is this: The dominant nation has been the one which has been for the time best able to meet the demand for a continuous and adequate supply of the best food for an increasing population. It goes without saying that national superiority is coincident with an increasing population, which of course must be provided for. Food supply must be continuous, adequate in amount, and of the

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best variety. To meet these requirements the food should be first of all suited to the demands of human life in its best development. The luxuriance of the tropical regions of the globe produces wild fruits in abundance, and the supply is fairly continuous but does not meet the demands of a life of laborious exertions. It is very perishable and must be daily sought in its wild growth. Rice, which more nearly approaches the glutenous grains, has not proved equal in its nutritive value, and needs to be constantly supplemented by perishable animal foods.

The best food should be easy of cultivation. The less labor that must be devoted to the cultivation of food the more labor may be devoted to the other employments. Food should not be perishable. The storing of materials of subsistence is an essential, as was known many years ago when a ruler in Egypt made provision against coming years of famine by causing great storehouses of grain to be provided. It has been often stated that the potato was the staple food, and the salvation of Ireland. In the light of the history of the last two centuries the statement may be flatly contradicted. The potato is very perishable and it lacks a third essential of a first rate food supply, which should be free from the liability of failure in its annual production. The world to-day does not contain food enough to last the world's population one year, and the nations would some day come to grief if so uncertain a crop as the potato were the best to be had. Another essential to the best supply of food is, that it should possess a persistent type. It should be little liable to sporting, as variability of plant life is called. In this the potato is very faulty as it soon runs out and new varieties must be frequently obtained by planting the seeds and not merely planting the tubers. Not to tediously multiply statements of a purely agricultural nature it may be stated at once that the glutenous grains, especially wheat, meet all the requirements which have been enumerated.

Now, examining our great triangle inscribed on the map of the eastern hemisphere we find it includes the wheat producing regions known to the world before the time of Columbus.

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When ancient Egypt was no longer able to feed its people, increasing in number, its wheat was introduced into new regions, and as new areas of cultivation were opened up, new nations came to the front in civil national life. The black bread of Russia is being replaced by white bread of wheat, and the coming of the Slav is coincident with it. If Napoleon ever said that the strength of an army was in a flour barrel, he might, with equal truth, have said that national progress, in short, civilization was equally so dependent. One may say that England has long been mistress of the seas and the greatest national power, but England's strength rests on her wheat producing colonies, and all history shows that commerce may be temporarily dominant, but that such power is not of a permanent character as witness the sad story of Venice.

The last four centuries have furnished a vivid confirmation of the theme of this essay. The United States, Argentina and Australia, all wheat producing countries, are now in a position of ability to meet the great demand of the human family. The level plains of Ontario, the great valley of the Red River are just now the granaries of the world, and where the granaries are, there is civil power, there is freedom, there is opportunity for every man. There is the highest type of human freedom, which gives to every man, not an equality which is impossible, but an equality of opportunity.

The history of wheat is the history of civilization. When the Semitic race escaped from Egypt, and by the great migration established themselves in Palestine, they were no strangers to the cultivation of the great cereal. Bread, both leavened and unleavened, was known, and supplemented by the vine and the olive, enabled an immense population to live on a mountainous territory until wasteful methods of cultivation had robbed the soil of its fertility. The Jews in the days of theocracy did not use yeast, but the sour leaven or the sweet or unleavened bread. The discoveries of the properties of yeast are comparatively recent, and its use is not general in Central Europe, unless within a few years. Leavening is simply souring the wet flour which renders the bread baked vesicular, or light, by the development of carbonic acid, and such bread is exceedingly

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unpalatable to most people who are accustomed to bread rendered light by the fermentive process set up by yeast.

Good light bread is greatly better as an article of diet than cracked wheat, oat meal, and the numerous mushes which a few years ago were so much vaunted, and when a housewife shows with pride the round, well browned loaves just from the oven, having the well known appetizing flavor, one will not generally go far wrong if he concludes that she possesses the other qualities of

"A perfect woman nobly planned
To warn, to comfort, to command."

THE SCHLEICH MIXTURE FOR ANESTHESIA.

BY DR. WALTER LATHROP, HAZLETON, PA.
READ JULY 6, 1898.

Attempts to produce anesthesia by inhalation were very early in use; we are told that the Scythians burned Cannabis Indica and inhaled its fumes; but little advance was made till the present century.

Formerly surgeons put their patients deeply under opium. Compression of the carotid arteries to deprive the brain of blood was also practiced. The Assyrians are said to have compressed the veins of the neck during circumcision. Compression of nerve trunks was advocated by Paré to deaden the areas supplied by them, and John Hunter amputated a leg after firmly compressing the sciatic and crural nerves.

Mesmer appears on the scene with his theory of magnetism, and in the words of one writer: "Although we may carp at Mesmer as a charlatan and quack, we must accord to him a meed of gratitude for establishing, upon a practical basis, a science which, before his age, was lost in useless verbiage." Cloquet, in 1829, amputated a breast while the patient was thrown into the hypnotic state.

In the eighteenth century Lavoisier, Priestly and Cavendish opened up stores of knowledge by the discovery of gases—

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oxygen, nitrogen, nitric oxide. They were closely studied, and Priestly added nitrous oxide to the list in 1772. Davy showed that nitrous oxide destroyed pain, and proved it by experiments on lower animals, but Wells, of Hartford, brought it into practical application as an anesthetic for extracting teeth. Not to weary you with familiar details and history, suffice to say that practical anesthesia was practiced about 1840 among medical students, who used the ether fumes for practical jokes, but in 1842 Dr. Long removed a small tumor from a patient to whom he gave ether. However, Morton's name is the one associated with ether as an anesthetic in 1846.

The subsequent history of anesthesia shows many attempts to modify or introduce new substances, and to-night I ask your attention to the subject of Schleich's mixture, and trust that you will not condemn without giving it a trial, for I believe a personal experiment is an honest basis upon which to reason for or against a new procedure. The experiments of Schleich, of Berlin, were commenced some three years ago and published then, but not followed up in this country until within the past year.

Schleich holds that anesthetics are more dangerous the more their boiling points differ from the temperature of the body. He maintains that the absorption of a general anesthetic is dependent on the boiling point, or maximum evaporation of the substance used. Less of an anesthetic having a boiling point of 60° F, will be taken into the blood than one having a boiling point of 159° F, as chloroform. If the boiling point, or maximum evaporation, approaches the temperature of the body the lungs are capable of regulating the elimination, so that nearly as much is exhaled as is inhaled. It is a well known fact that deep narcosis cannot be produced if the maximum of evaporation and the temperature of the body are equal. When the maximum is greater more of the narcotic is absorbed than is eliminated, and in this case elimination falls upon the kidneys, heart and liver, at least they are called into action; this shows why the after effects of chloroform are more pronounced than ether. Ether has maximum evaporation of 93° F, at temperature of 100.4° F, and must dilate and expand the al-

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veoli of the lungs, and this it is that produces a certain degree of cyanosis.

Chloroform, owing to its high boiling point, is absorbed by the blood to a greater extent than needed, while ether is converted into vapor very rapidly and fills the alveoli. The A. C. E. mixture has maximum evaporation at 119° F, much nearer the temperature of body than chloroform. Schleich started his experiments on the ground that the narcotic, to be safe, would be one in which the amount eliminated during expiration would almost equal that absorbed during the previous inspiration. A drug which evaporates rapidly is eliminated by the respiratory organs rapidly, and one which does not evaporate quickly will remain longer in the system and become more dangerous as inhalation progresses.

A narcotic with boiling point of 15° C, such as ethyl chloride, and chloroform, with boiling point at 65° C, will act difdifferently on a person with temperature of 38° C. Bromide of ethyl, with boiling point of 102° F, very near the temperature of the body, would be an ideal anesthetic could we overcome the action of the bromine.

The chief features of his (Schleich's) work are as follows:

1. Ether and chloroform were mixed with a benzine having boiling point at 60° or 65° C.

2. By mixing these substances, in varying proportions, he claimed a true solution, not a mere mixture.

3. By changing the proportions of the components he could change the boiling point or maximum exaporation at will.

4. The effects held good, and were verified in cold blooded, as well as warm blooded, animals.

5. The result was the same by inhalation, the rectum, or subcutaneously.

6. The result was the same in the human subject as in the lower animals.

He recommended three (3) solutions by volume:

No. 1. Chloroform, 1½ oz.; petroleum ether, ½ oz.; sulphuric ether, 6 ozs. Boiling point, 38° C or 100° F.

No. 2. Chloroform, 1½ oz.; petroleum ether, ½ oz.;

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sulphuric ether, 5 ozs. Boiling point, 40° C or 104° F.

No. 3. Chloroform, 1 oz.; petroleum ether, ½ oz.; sulphuric ether, 2⅔ ozs. Boiling point, 42° C or 107° F.

Schleich has anesthetized over 1,000 cases with this mixture and without any complications.

Maduro reports 100 cases, and sums up his experience in the highest terms, laying stress on the freedom from vomiting, absence of excitement, and rapidity with which patients go under the anesthetic, and their rapid return to consciousness after operation. Emil Mayer, in his paper on the subject, found his results to be the same as Schleich had reported, and he believes the anesthetic very safe and desirable, especially for short operations about the head. Delavan is another who speaks in its favor.

Simpson thinks that the rapidity of action is a point in its favor, especially the short period required to regain consciousness. Faries reports his experience in accord with Maduro, Mayer and others.

The general results given before the surgical section of the College of Physicians, Philadelphia, was very favorable. Dr. Skene, through one of his assistants, writes me that they have used the No. 3 in about forty cases, in the clinic and in his sanitarium, and has complete records of them; the letter says in part: "I much prefer it to sulphuric ether, because it acts more quickly; is much more pleasant; there is less excitement; much less bronchorrhoea; much less after-thirst, and less diffusion of ethereal vapor.

A few cases showed signs of cyanosis, which I attribute to using the "close" method with the towel cone.

Dr. Meyer, of New York, writes me under date of June 8, 1898, from which I quote the following: "You ask what I think of the Schleich mixture; I can but repeat what I stated December 27, 1897, before the New York County Society, that I continue to be highly pleased with the working of these mixtures. Personally I have not seen a single untoward effect from them in all the cases in which I made use of them. It

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is only in view of the experiments of my friend, Dr. Meltzer, who found that petrolic ether if inhaled *pure*, to be a poison, that I have, for experiment's sake, employed for the past three months the nucleus of Schleich's mixture, the so-called M. S. I must say that so far this has given me a great deal of satisfaction, yet I am not willing to say that it is in any way better or safer than the original Schleich mixture. I shall continue my researches and hope that chemists and physiologists here in the city who are diligently experimenting with different anesthetics, will come to our help and tell us whether we can safely continue the original Schleich mixture or whether we shall have to find a still safer anesthetic mixture, having its boiling boint at 38° to 42° C."

Prof. Garrigues, in a paper read before the American Gynecological society at Boston, in May, gave his experience in 100 cases. "The general effect of the anesthetic, both during and after operation, had been satisfactory. It greatly promoted the patient's comfort, and its administration was simplicity itself." He used the Allis ether inhaler, leaving the top open till consciousness was nearly lost. He used the No. 1 almost exclusively.

There was much less cyanosis than is usually observed in the Trendelenberg position.

There was no vomiting at all in seventy-one per cent. of his cases, and in the remainder it was very slight. Respirations were invariably increased. Deep respiration and slight superficial breathing should indicate the necessity for an immediate interruption of the anesthetic. He recommended the Schleich mixture, especially to the gynecologist, and for general use.

Dr. Kelly thinks ether can not fairly be compared to other anesthetics, as it is usually given so wretchedly in this country. Mann, of Buffalo, stated that he had found in examination of urine in thirty cases that fifty per cent. of these cases had albumen, with granular and blood casts, shortly after giving ether.

Noble and Kelly reached these conclusions also in an independent investigation. My personal experience has been

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in sixty-five cases, of various kinds and severity. I have used the No. 3 mixture in nearly every case, giving it on a wire mask covered with gauze, and containing a small sponge, or cotton. By this method air is constantly passing in with the vapor, and the result is exceedingly gratifying. No. 1 is best used in regular inhaler, and when the patient is about losing consciousness the top can be covered with a towel, after which only a few drops now and then will be needed to keep the patient thoroughly anesthetized. I have seen excitement in only one case, patients usually going under in five or six minutes. The shortest case being anesthetized in three minutes by my assistant, Dr. Jones; the longest period observed was eight minutes.

I have never seen cyanosis, save in one case where patient swallowed his tongue; collection of mucus in the throat, often so annoying with ether, I have never seen; vomiting was absent in nearly every case, and when it did occur was not severe. One case vomited when on the table, and three after regaining consciousness. The pulse was good in the majority of cases, and its tension increased, save where the patient had suffered from shock; in fact the mixture seems to increase the strength and fulness of the pulse.

The respiration should be watched carefully, and when shallow or very deep, more air should be given. I have never had a troublesome symptom whatever. The patient regains his senses rapidly; there is very little after effect, and very little depression, though I have given strychnia in several instances, following anesthesia, where the patient had been severely injured. These mixtures are easily prepared, and should be made up fresh, or else kept in a cool, dark place, in an amber bottle, as otherwise they will be apt to lose efficiency.

The petroleum ether should be strictly pure, and be procured from reliable chemists. I believe Cooper prepares the best.

One case in which I thought the anesthetic would have a fair test, was an abscess of the liver; the patient had a pulse of 166 and temperature of 104°F, at the time of operation. His condition was critical and demanded interference. He was

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anesthetized about six hours after admission to the hospital; with pulse, etc., as above.

His condition remained the same during operation, and he had no troublesome symptoms whatever while under anesthesia. There was no vomiting at any time; his recovery was uneventful.

For my own part I expect to use the Schleich mixture and nothing else, unless great changes occur in future cases, but I believe, at present, it is the nearest approach to a safe and pleasant anesthetic that we have had thus far given us. Schleich is certainly working in the right direction and may at a future date give us a further modification that will prove to be the long sought nepenthe that the ancients feebly worked to produce and which mankind has labored to perfect.

I would ask each of you to try this for yourselves, and I feel sure you will not be disappointed; if you are, after testing it in not *one*, but in a *dozen* cases, then condemn it. As we are all anxious to advance, and willing to try what seems good, so my excuse for presenting this to you is simply that you may discuss it pro and con, and, believe me, if what I have said induces some of you to test the truth or falsity of this subject, I shall be repaid and I believe you will be also. The discovery of the sleep producing vapor lifted the veil of suffering from the face of agony in the past, and permitted dreams of peace to pass through the sleeper while the surgeon calmly and skillfully completed his work, and we can well say with Mitchell:

"Whatever triumphs still shall hold the mind,
Whatever gifts shall yet enrich mankind,
Oh, here, no hour shall strike through all the years,
No hour as sweet as when hope, doubt and fears,
Mid deepening stillness, watched one eager brain,
With God like will, decree the death and pain,
A solemn hour for such as gravely pause
To note the process of creation's laws,
Oh, sure, He whose dark unfathoned mind
With prescient thought, the scheme of life designed,
Who bade his highest creatures slowly rise,
Spurred by sad needs, and lured by many a prize,
Saw, with God's pure joy, His ripening plan,
His highest mercy, brought by man to man."

NOTE.—Since the above paper was written I have used the

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mixture in upwards of 125 cases in all, and can only emphasize what I have said. The only change made is that I use No. 1 exclusively for all work of any length, and No. 3 for brief operations, especially about the head. I use the Allis inhaler; covering it as soon as patient begins to go under, and then adding a few drops frequently. The amount used for an operation lasting thirty-five or forty minutes is about two ounces, sometimes three. The paper by Prof. Garrigues, in a recent number of Medical News, covers the ground well. The chief thing to watch is respiration, though it is rare to have any trouble of consequence. I believe it to be pleasant and practically safe, so far as my experience goes, and I hope to again report its use in the near future.

NOTES ON TUMORS.

BY DR. C. P. KNAPP, WYOMING, PENN'A.

READ AT THE MIDSUMMER MEETING AT HARVEY'S LAKE, PA., AUGUST 10, 1898.

Tumors should be sharply distinguished from inflammatory swellings and retention cysts. From want of this sharp distinction errors creep in, which vitiate our statistics, embarrass our results and leave a fruitful field for quacks, as well as lower the work of the surgeon from the exactitude it should have to-day.

I know of no better definition than Senn's: "A tumor is a localized increase of tissue, the product of tissue proliferation of embryonic cells, of congenital or post-natal origin, produced independently of microbic causes;" while not a perfect definition, it gives us a fair idea of their histogenesis and pathological features.

The line that separates the benign from malignant tumors is not so well drawn as a few years ago, but the difference is marked enough to be still preserved, and is of benefit in the study of the growths we are considering. Some writers con-

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tend that a benign tumor is always benign, a malignant tumor always malignant, and while many of the apparent transitions in the benign tumors are well explained, the point of departure where an embryonic connective tissue cell or epithelial cell, of an adenoma for example, from becoming perfect, as they do in benign tumors, or remaining embryonic and malignant is yet too subtile for the histologist to grasp. That unseen and unknown something that starts and compels these cells to their destructive wanderings, be it nerve force, toxine or what not, we must still recognize if we cannot explain. We all know that benign tumors are mobile, and enclosed in a capsule, which keeps them distinct from the surrounding tissues, but the not infrequent recurrence of these tumors after removal cannot always be explained by incomplete removal; a mistaken diagnosis, or the recurrence of a new tumor in the old scar, or possible engrafting of a malignant tumor. A tumor cell is an erratic cell, and its behavior cannot always be depended upon.

The clinical aspects of a malignant tumor are more uniform. To the surgeon they give very good indications of character, of fatality, and prognosis. (1) Rapid growth. (2) Absence of limitation of growth. (3) Local infection. (4) Regional infection. (5) General infection. (6) Frequency of occurrence after extirpation. (7) The intrinsic tendency of the tumor to destroy life. The word infection as applied to tumors, most writers explain, is not used in the same sense as infection by pathogenic microbes, and yet I often look upon the demonized cell of a malignant tumor as a pathogenic microörganism, *sui generis*. It wanders through the organism by the connective tissue, giving rise to local infection, or through the lymphatics, giving rise to regional infection, or through the general circulation to produce general infection. Always the same cell—producing like cells, with rapidity, wherever it wanders, and giving out a toxin, which slowly permeates the whole system to its destruction. What micrococcus, what bacillus has a more definite life history. Is this malignant cell not unlike the rogue elephant, cut off from his kind, still an elephant, but an enemy of all? No dendron, no terminal

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of nerve cell controls it. It has no allegiance, no leader. It hunts alone, and its victims are doomed to torture.

The blood vessels of the aggregation of these malignant cells, called tumors, are soft, and in the rapidly fatal forms mere channels between the cells. The pressure of tumor growths upon the blood vessels of the surrounding parts causes absorption and perforation, and thrombosis and embolism are the result, the latter often the source of a new growth.

Lymphatics are not present in benign tumors, but are plentiful in malignant, as if nature endeavored to eliminate the offending cell or its product.

Nerves have not been generally observed in tumors, except the myelinic neuroma. The study of the nerve supply of tumors is of interest. The general want of system in the growth of tumors would point to a lack of nerve supply.

The cells that compose a tumor bear a striking resemblance in behavior to the micro-organisms of acute infectious diseases. Highly infectious pathogenic organisms multiply rapidly, and affect the patient gravely and quickly. Highly malignant tumor cells multiply rapidly, and affect the patient gravely, but this appears to be modified as in acute infectious diseases by the condition or resistance of the patient. Resistance of individuals is more marked in benign tumors; while any condition of the system, as pregnancy or lactation, lowering the resisting power adds to the growth and multiplication of the cases. Age also here shows its influence. The extremes of life giving the greater number of cases of malignancy, while adult life shows more benign growths.

Tumor cells draw their pabulum from the blood. They are good feeders—they insist on quantity and quality. There is a hint both to the physician and surgeon in this fact. Limit the blood supply, avoid both irritation and inflammation, or whatever is likely to produce it. Cut off the blood supply.

The cells of tumor tissue arise and multiply exclusively from the matrix cells. The surrounding tissues or cells take no part in it. Benign tumors push surrounding tissues aside. Malignant infiltrate. The connective tissue type following

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connective tissue nerve sheaths and blood vessels—the epithelial type, the lymphatics.

Tumor tissue is subject to the same degeneration as normal tissue, but it is seldom if ever removed by degeneration. Fatty, mucoid, colloid, amyloid and hyaline degeneration are often found in cells and groups of cells. Casteation, calcification and ossification are not infrequent.

Colenheim and the old writers attributed cell tumors to matrix-cells of pre-natal origin, but modern observation leads us to look upon an increasing number of tumors as of post-natal origin. Embryonic tissue of post-natal origin answering the same purpose as a congenital matrix, that is epithelial cells buried in a scar will produce an epithelioma, as in the healing of a burn, or in a lacerated cervix, given an exciting cause to start them to proliferate.

From an etiological standpoint we must consider a matrix of embryonic cells as the sole cause of tumor formation—that this matrix may be either congenital or post-natal—to this must be added an exciting cause. Heredity, a matrix of embroynic cells, and a lack of resistance on part of the whole organism are the two essential things handed down from parent to child. Race, climate, age, sex, social status, traumatism, irritation and inflammation contribute etiological factors. Contagion has never been proved to play any part in transmission of tumors.

Study of numerous cases by Weber, gives the following location in order of frequency: mouth and maxillary bones, glands, skin, genital glands, lungs, nose and accessory cavities, subcutaneous and intermuscular connective tissue, eyes and orbits, genital organs, intestines, urinary organs, brain.

Diagnosis and Prognosis.—There is science and art and far reaching results embodied in the diagnosis and prognosis of tumors. Too much didactic teaching has rendered this subject bewildering to the student. Given a thorough knowledge of anatomy, physiology and pathology, and trained senses from bedside teaching, our subject is not only simple but intersting. Clinical history must be accurately taken; how often is an inflammatory swelling mistaken for a tumor! Heredity must be sought through all the branches of the family. The factor of

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time must be clearly and exactly estimated. The location well studied so that the matrix can be referred to its histogenetic source—and skin and mucus membrane relations closely observed. Rapidity of growth inquired into, pain and tenderness carefully referred, especially the latter, which is most usually an attribute of an inflammatory swelling. Examine the patient not only locally but generally and as to all organs and functions, bearing in mind that before recommending operation, secondary growths, condition of the brain and kidneys must be known. Operations for benign tumors have been fatal from an undetected albuminuria, and operations performed for superficial tumors when brain, lung or liver have held secondary deposits. Nearly all parts of the body are now rendered accessible by instruments of precision. Inspect the morbid growth as to color, size, form and structure of surface, location and transmission of light. Color gives us its possible arterial or venous origin, pigmentaton its malignancy and discoloration, hemorrhage and inflammation. Size as to origin, sudden increase in size as to connection with the circulation. Form and structure as to its encapsulation or infiltration and the resistance of its surroundings. Transmission of light its consistency. An exploratory syringe is of great value. The value of the microscope is often underestimated because of the imperfect specimen taken from the tumor for diagnosis. The microscope should be added to all the other diagnostic resources, that a correct diagnosis be obtained prior to removal. Isolated cells, curettings, teased portions are not always to be relied upon. A harpoon with local anaesthesia should be used. While wounding of the tumor is to be avoided if the microscope is to settle question of malignancy or non-malignancy in an operable case, I think the wounding of the tumor of minor importance. Finally, in diagnosis include every available point of information, for the crucial question comes all too soon, "Have I a cancer?" and our prognosis is expected. Never make a diagnosis or prognosis to patient or friends until the nature of the tumor has been carefulfy studied and ascertained by conclusive evidence. Give your diagnosis and prognosis to the family, but withhold it from the patient as long as circumstances will permit. Re-

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member, a tumor is benign in proportion to its isolation from tissues and organs; that the nearer its clinical aspects and anatomy correspond to inflammation, the greater its malignancy; that the dangers of a tumor depend upon its capacity to implicate adjacent tissues and the organism; that the complete removal of a benign tumor is not followed by recurrence; that favorable results may be expected from the complete removal of a sarcoma or a carcinoma before *regional infection* has taken place; that all other operations are only palliative and that incomplete removal or removal after general infection aggravate the case, and hasten the fatal termination."

The protozoan theory of the causation of cancer, by which I mean malignant tumors, has not received sufficient proof or clinical endorsement to be more than mentioned. The protozoan found in the blood by some observers has not been demonstrated either to be a microörganism or even an abnormal element of the blood. And the so called cancer areas of London and some other large cities can be explained far more intelligently. That this theory, or perhaps better, the microorganic origin of cancer impresses itself upon all pathological workers is self-evident and the purport of this little paper is to advance a theory that the embryonic cell, a cell released from the guiding power or control of the organism, be it pre-natal or post-natal, finding a suitable exciting cause or culture media behaves to the body as the microörganisms behaves in its multiplication and effects, for this embryonic cell differs little in its histology from other microörganisms, and that it is noncontagious is because of its dependence on a peculiar and limited cultrue media, and its failure to find such a media, though the engrafting of malignant tumors upon benign and the apparent transition from benign to malignant may be explained by contagion.

DISCUSSION.

Dr. Ernest U. Buckman.—In the busy present, in our eagerness to be well-informed on the *new* things being constantly added to medical lore, we have very little time to devote to old things, and perhaps most of us do not have access to very old medical literature. Feeling my inability to add

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anything to what Dr. Knapp has said, or to in any way discuss his paper, it occurred to me that I might interest you for a few minutes by presenting something very old on the subject of tumors. Accordingly I have quoted from an old volume found in Dr. Taylor's library what is probably all that was known at that time of this very important subject. It is from a translation of a volume "Printed in Latin at Leyden in 1728."

The author makes two classes of tumors, schirrous tumors and cancers, and the article is as follows:

"*Of a Schirrous Tumor.*—A Schirrus may be occasioned by anything able to coagulate, thicken and dry the Juices in the Glands: Its Seat, therefore, is any Kernel, but chiefly such as contain a Liquor which thickens easiest, or, because of its Situation, occasions the same to stagnate most. So that this Distemper is most common in the Eyes, Nostrils, Mouth, Breasts, Arm-pits, Groins, the Pancreas, Mesenterium, and the Uterus.

So that the same may be produced by an Inflammation in those Parts: by Milk stagnating, containing too great a pro-Portion of caseous Matter, hardened and coagulated: by Contusions; by violent Motions and Attritions of those Liquids; by Plague-sores, Bubos; Ulcers closed too soon; by the Blood being overcharged with black Choler carried thither, or black Choler itself, and chiefly when at the same time the Menstrua or haemorrhoidal Fluxes are suppressed; by Matter's growing stony, thick, rough and like Plaisters; by a sorrowful Life, hard Living, or this vicious Habit being derived from Parents.

The Effects of a Schirrus, when made, are to occupy the adjacent Parts by their increased Bulk, to squeeze, and even to lay a great Force upon 'em; to hurt, and damage the Function both of the schirrous Part, and of the adjacent; whence Inflammations, Imposthumes, Gangrenes, Palsies, Wastings, Sphaceles, Barrenness, difficult Labors, Iliac Passions, and the like Ills, are produced; whereof the immediate Cause is easily known from the Nature, Offices, and Seat of the damaged and of the Compressing Parts.

Their Presence is known from their Causes, Effects, Phenomena, the affected Part compared with the Constitution of the Patient.

From the same, their Event is foretold and chiefly considering the Time of their Duration, and their Effects. Of itself a Schirrus is harmless enough, but becomes malignant, if by any means you put its Cause and Body in Motion.

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Which Motion being scarce avoidable, occasions continual Uneasiness and Fear.

So that whoever attempts the Cure of them, ought to observe,

1. That if a Schirrus be recent, good natured, seated in a convenient Place, not yet quite hardened, the Patient be of a very good Constitution and sound Juices; that in those Cases he may attempt to *resolve* it by gentle emollient Means; whereto belong the Steams of Acids directed to the part by Means of a Funnel; but chiefly the use of Mercury given inwardly in small, but often repeated Doses, and outwardly mixed with cooling and emollient Medicines!

2. If it doth not give way to those Means, and that the Place, Situation, the adjacent Parts, Movableness, the Degree of Ill, the Strength and healthy Constitution of the Patient will bear it, the same ought to be forthwith cut out with a Knife.

3. If it is of an old standing, and, from its Colour, Hardness, Unevenness, Itching, and beginning Pain, is known to be Malignant; if from the Seat, and adjacent Parts, there is reason to fear that it is adherent to several Vessels, and in an ill Habit of Body, then is it impossible to extirpate it: Then ought all Things to be avoided, which may increase the Motion there, that it may not turn into a Cancer. So that all emollient, suppurating, eating, caustick, and dissipating Medicines, or Applications, are here forbidden.

4. But only those are of use mentioned, that is, Anodynes, such as quiet Motion, Medicines made of Lead, and very gentle Mercurials.

If at the same time the Patient's Constitution is bad; that ought, above all things, to be corrected by proper, but gentle Means.

Of Cancers.—If a Schirrus by long Standing, Increasing, and Motion of the adjacent Parts, is thus moved, that the neighboring Vessels around its Edges begin to inflame, it's become malignant, and, from its Likeness to a Crab, is now called a Cancer or Carurioma.

In which we discover the Conditions of the first Degrees of Malignancy, from the light Degrees of Inflammations all around it, from an Exuberancy of a putrid Acrimony in the very Part; from the Use and Dignity of the same Part, from the Number and Condition of the annexed Glands, and lastly, from the ill Habit of the Patient.

If it be still contained within its proper Skin, its an *occult Cancer;* but if that Skin be already broke through by an Ulcer, its called a *manifest* and an *ulcerated Cancer;* This last is the Offspring of the former.

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The Cause of a Cancer is all that produces a Schirrus: a Sharpness conveyed into and mixed with the Schirrus; an Alteration in the Circulation of Humours, from a Suppression of the Menstrua, Haemmorrhoids or any other Haemorrhagy, from Barrenness, Abstinence of all veneral Acts; the leaving off of Child-bearing from the age of forty-five to fifty; an austere, sharp or hot Diet: the several and even contrary Affections of the Mind, whether Melancholy or Anger, and the like; any external Irritation of the Schirrus by its Motion, Heat or Acrimony; or Medicines which, by their emollient, suppurating, caustic or blistering Qualities, will produce the same Effect, whether outwardly or inwardly applied.

Its seat is the same with a Schirrus.

The Presence of an *occult Cancer* is known, when the Signs of a Schirrus have preceded, and, as an Addition, there is a Titillation, Itching, Heat, Redness, a tearing, burning and poignant Pain; when the Color changeth from reddish, to red, purple, blue, livid and black; when it is grown very hard, uneven, and rough, with a pointing Top; when the Tumor is increased, and the adjacent Vessels also are swelled with Nodes and Varices, and their Contents look thick and black.

An *ulcerated Cancer* is known to be such, for having had first the sure Signs of a preceding *occult* one, and that is uncovered; for then the Skin is laid open, as by an Excoriation, and there oozes out a very thin and sharp watery Blood.

Its Progress is thus: the *undamaged Vessels* being worn out about the Margins of the hard Cancer, by the Power of the flowing vital Liquid, and pulled asunder by the rising Tumor, *are at last broke:* hence a Putrefaction; then a subtle, sharp, stinking, cadaverous Matter, preying upon the Surroundings, and eating through the next adjacent Parts, still gaining Ground all around, and shooting its malignant Roots everywhere deep into the adjacent Muscles and Vessels, by Means of which it fastens itself; the Lips swell, are turned up, and of a frightful Aspect. Now the Pains begin to be insupportable, burning, pungent and gnawing; the Color is of ash, then livid and black; occult Cancers begin to communicate themselves to other distant Places in the Body; at last come on Haemorrhages, Convulsions, slow hectic Fevers, a wasting of the whole Body; it becomes void of Stench, or any Odour; there grow painless Callosities in the Ears, the Patient faints away frequently, so that when all the Substance of the affected Parts are eaten through, and the whole Body is consumed, Death follows, as a necessary Consequence.

In People of a sound Habit of Body, an occult Cancer, un-

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provoked, may easily be bore; but if they meddle with it, you may foretel what was just now mentioned.

A small, beginning, loose Cancer, seated in a convenient Place, not adhering to large Vessels with its Feet, occasioned by an external Cause in a youthful and healthy Body, and single withal, ought forthwith to be either pulled out, or the Part, in which it is, to be cut off.

All emollient Medicines therefore, such as shut the Pores, suppurating, sharp, excoriating, vesicating, and Causticks are to be avoided, for their Application infallibly converts it into an ulcerated Cancer.

A large Cancer, an old, adherent one, situated in Places unfit for Extirpation, grown to large Vessels, or lying close upon them, arising from an internal Disposition and Cause, in an old Body of an ill Habit, inclined to breed Cancers, when there is already some other in the same Body, ought not to be meddled with at all, neither by Cutting nor Physick.

For unless it can be rooted out entirely, with all its Roots and Seeds, it will grow more ill-natured, turns upon some inward Parts, begets more, and enlargeth those already produced.

The cause of the Cancer ought to be removed with the Cancer, or even before it be taken out.

Unless it can be taken out entirely it ought to be relinquished.

Those of the Uterus, of the Throat, of the Palate, of the Arm-pits, and of the Groins, are incurable; those of the Lips very difficult to cure.

If therefore the Case is as (just described) we endeavor at two things:

1. The Keeping of the Evil dormant and quiet.
2. The assuaging of the Symptoms.

It is kept quiet, 1. By defending the Place from all external Injuries, by Lead Medicines and Opiates. 2. By lessening, correcting, or diverting the known Cause whereto belong gentle Purges from Vegetables or mercurial Preparations given often, but in small Doses. 3. By diluting and gently opening Medicines, and moderate Alkalies, as testaceous Powders and the like. 4. By avoiding every thing that might be a Supply to the inward Cause, whether applied outwardly, or inwardly taken.

The Symptoms may be assuaged by the same Means, and acute Pains require Opiates in pretty large Doses.

An ulcerated Cancer, unless it may be extirpated, requireth for Ease, to be cleansed often, and to have the softest cooling Preparations of Lead applied, besides the use of the remedies (mentioned above.)

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The Extirpation is performed,

1. After having first prepared the Patient with a strengthening Diet and Medicines, and such as are contrary to the Cause.

2. By cutting out the whole altogether and at once, with all its Roots, having run a strong Thread through the Body of it, or holding it up with a Fork thrust underneath it, or having laid it bare, and separated its Integuments from the adjacent Parts and Vessels, by lifting up the same by a Thread run throught it, and at last loosening the whole on all Sides with much Caution.

3. The Wound then remains to be cured, which ought to be done by laying on a Bandage very gently, and dressing it but seldom, having first squeezed the Blood out of all the surrounding Parts.

After this the Patient ought to continue very long the same Diet and Medicines as if he had still a Cancer. And from the precedent Aphorisms it is plainly enough foreseen what Ills must be expected from a Cancer situate in Places unfit for Extirpation."

A CASE OF NECROSIS OF HUMERUS

WITH DESTRUCTION OF THE MUSCULO SPIRAL NERVE AND PARALYSIS OF THE EXTENSOR MUSCLES OF THE FOREARM; OPERATION FOLLOWED BY RECOVERY.

REPORTED BY DR. S. M. WOLFE, WILKES-BARRE, PA.

M. B., aged eight, school girl. Family history is good. Patient was in good health until four years of age, when, without any known cause, a sinus formed on the anterior aspect of the right arm, two inches below shoulder and has discharged pus constantly since that time. Soon after, three other sinuses formed, one at middle of arm anteriorly, one about two inches above elbow anteriorly and one at the middle third of arm posteriorly. These remained open and discharged pus for nearly four years. For several weeks previous to operation patient had been gradually losing power of extensor muscles of forearm, and at present there is complete paralysis of these muscles. The treatment, I am told, has consisted in the application of salves, lotions and internal medication. There is no evidence of constitutional syphilis or tubercular involvement of lungs. A probe inserted in any of the openings comes in contact with roughened dead bone. I first saw the case August 12, and

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operated the following day, making an incision almost the entire length of the arm, so as to include the three openings anteriorly and a transverse incision to the posterior sinus. When the soft parts were dissected back, I picked up two scales of bone which lay loose at the bottom of wound, one three inches long and the other a half inch shorter. I then with a bone gouge scraped away a good handful of softened bone. The entire shaft was so black and soft that it seemed almost out of the question to save it, and I seriously considered an amputation at the shoulder; but after consulting Dr. Davison, who was assisting me, we decided to wait a few days before resorting to such a measure. My index finger passed through the entire shaft of the bone with ease, emerging posteriorly at the site of the old sinus. Through the opening thus made, a rubber drainage tube was passed and another along the bone anteriorly from the upper to lower angle of wound, with stitches and dressing completed the operation. Nature was kinder than even we dared to hope in this case. The wound healed slowly, and at the end of six weeks was entirely closed. The drainage tubes were left in place for a week, and during this time were flushed out daily with peroxide of hydrogen and bichloride solution. At the time of the operation I had made no attempt to find the ends of the musculo spiral nerve, for at the site of the groove the bone was entirely gone. Then too, I considered the purulent condition of the wound and that the arm would probably be lost. The family were told the danger of losing the arm, and that if we did succeed in saving it that the paralysis would very likely remain. About two weeks ago I was called in to see another member of the family and was much surprised to find my little patient in full possession of power in the paralyzed musclse, which had been restored quite rapidly, it having been only ten days since she had noticed any return of strength. Whether the nerve in this case had been bound down in the dense calloused tissue, or whether it had been divided by the necrosis, and after the parts became healthy re-united, I don't know, although I believe the latter to be the more likely. At any rate, mother nature must receive the lion's share of the laurels, for her part of the work was admirably done.

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GUNSHOT WOUNDS—HISTORY OF CASES.

BY DR. J. B. MAHON, WILKES-BARRE, PA.

READ SEPTEMBER 7, 1898.

In the paper which I have the honor to present to you this evening no attempt has been made to consider the subject of gunshot wounds from the standpoint of the expert military surgeon.

To do so would require wide research, coupled with ample experience on the battlefield and in military hospitals. My object is rather to discuss the subject from a local point of view, if I may use the term, or from the standpoint of the ordinary practitioner of medicine, to which I may add the histories of a few cases that have fallen under my own observation. These of course do not relate to the dynamite bomb, shells, Mauser missiles, explosives, expanding, jacketed bullets, and numerous other projectiles used in modern warfare, but refer mainly to the ordinary leaden ball and the birdshot injuries with which we, as every-day practitioners of medicine, come in contact.

Of late years, in the valley of Wyoming, due chiefly no doubt to the importation of men from almost every clime, a large majority of whom can scarcely lay claim to the highest grade of civilization their native country affords, the bulldog revolver and the stiletto have been given unenviable prominence in settling pay-day disputes or in determining the particular fighting qualities of the latest brand of "polinky."

Occasionally the more formidable Winchester is brought into requisition, as was the case in the memorable "mountain massacre," where Messrs. Flanagan and McClure fell victims to the murderous volley of Rednose Mike and his band of highwaymen.

In the light of the present era we look back over the history of medicine and surgery and find that in each department rank ignorance and superstition mark every step of treatment pursued. Gunshot wounds form no exception to this rule. Mixtures composed of toads' paws, wolves' eyes, vultures' claws,

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dried lizards and scorpions, tigers' feet, snake skins, incinerated remains of mummies, ashes of swallows' nests, goats' dung, &c., used for curing the sick, find their counterpart in the pouring into wounds of scalding oil, scarification, cupping, bleeding, purging, poulticing with all manner of vile substances to eliminate the supposed poison and heal the injury produced by gunshot. To-day no one doubts that a century ago for every fatality directly due to gunshot wound a dozen lives were sacrificed as the result of septic matter introduced into the wound by clumsy interference or unclean applications.

Equally true is it that the antiseptic principles evolved by the immortal Lister have absolutely reversed these conditions, besides destroying forever the poisonous theory of gunshot wounds, so tenaciously maintained by the surgeons of a former generation.

Gunshot wounds may be conveniently classified as contused, penetrating and perforating. Contused, when a spent ball strikes the body without sufficient force to penetrate, or striking the body at an angle glances off, or when articles of clothing or other objects intervene, the skin and underlying structures to a greater or less degree being bruised, blackened or burned, but the ball not entering deeply enough to find lodgment.

Penetrating—if the missile passes through the integument and lodges in the tissues beneath; and perforating—when the bullet has entered any part of the body and passed out leaving a wound of exit.

A contused wound, the result of an ordinary firearm, does not differ essentially from contusions produced by other means. There will be found in both, ecchymosis, pain, swelling and sensitiveness of varying intensity in proportion to the force and weight of the missile producing the injury. Of course in military experience contusions resulting from the impact of heavier projectiles assume a graver aspect, not infrequently producing fracture of bones, rupture of viscera, or destroying life.

Longmore relates an incident during the Indian mutiny where a gunner lay beside his gun to rest himself. A round

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shot from the Sepoy works glanced along his right thigh, passed obliquely across his abdomen and chest and finally smashed the upper part of his left arm, necessitating immediate amputation of the arm. The man had not consciously felt the passage of the shot across his body, nor did the skin of the trunk or thigh exhibit any trace of injury at the time. His trousers were not torn. On the third day after the injury the surgeon's attention was called to the soldier's thigh, where a broad deep slough extended down to and exposing the femoral artery, was found. The abdomen and chest had not been appreciably injured by the downward pressure of the ball in passing over them, although the clothing covering them had been cut through and stripped from his body.

I have witnessed two instances, one known to be, the second a supposed, gunshot contusion. The first resulted from a thirty-eight caliber bullet fired at close range from a revolver, and, striking a match-box in the vest pocket of the victim, glanced through his clothing, grazing his stomach, blackening and apparently burning the skin, and in fact gouging out a portion of it, so that for a time, as it was night and the examination made by a poor lamp-light, I was undecided whether or not the ball had penetrated the abdominal cavity. The use of a bullet probe and the introduction into the wound of the tip of my little finger failed to reveal a bullet track, and a bystander finding the ball lodged in a window casement of the room cleared up the diagnosis. The symptoms, however, were quite severe: considerable shock, nausea and emesis, the vomited matter being slightly streaked with blood, with tenderness over the entire abdomen for several days.

The second case was a contusion found upon the right side of the head of Barney Flanagan who, with James B. McClure, lost his life in the mountain tragedy before referred to. Just above the right ear along the temporal region a distance of two inches and parallel with the upper margain of the parietal suture, the hair was cut clean from the scalp as though a bullet had grazed it; the scalp was pulpy, discolored and swollen. Of course his death resulted immediately from his more fatal wounds, and it was uncertain as it was immaterial

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whether this particular wound was caused by a bullet or a blow from the butt of a gun.

A penetrating or perforating gunshot wound may be said to be exaggerated forms of punctured wounds, because in many instances the extensive concealed injuries are out of all proportion to the small wound of entrance made by a common bullet. In this particular a wound of this character differs essentially from one produced by almost any other weapon. From whatever direction a ball enters the body it may plow its way through whatever muscle, bone or organ that chances to be in its track, and not infrequently by coming into contact with osseous formation or resisting tissues, is deflected from its course and lodges far remote from the wound of entrance and in a direction entirely different from its supposed course or location.

A striking illustration of this fact was presented in one of the wounds inflicted upon Mr. McClure. As will be remembered, he and Flanagan were fired upon from the rear as they were riding along in a wagon up the road leading from Miners Mills to their camp on the mountain. Both men were shot several times. It is probable McClure was first struck by a bullet in his shoulder, which caused him to throw his body backward, when a second bullet penetrated the spine at the seventh cervical vertebra, split this vertebra, and being deflected ranged downward lengthwise of the body and dropped into the scrotum, which organ showing discoloration and some swelling attracted my attention to it.

The principles of treatment in gunshot injuries do not differ from the accepted methods pursued in other wounds. Asepsis and antisepsis are the watchwords, and in no class of surgical cases are they more sternly demanded.

The early belief that leaden balls carried a peculiar poison, which rendered the wounds produced by them more dangerous than other wounds, held sway among surgeons until a very late period. It is true the idea was antagonized by Ambrose Paré, Gale, Wiseman, Velpeau and others. While their opinions may have acted as an entering wedge in paving the way to a better understanding of the true cause of the uniformly un-

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healthy and dangerous course these wounds ran, yet they failed to establish any principles whereby this condition could be corrected.

So late as 1870, in the Franco-Prussian war, the Germans complained that leaden balls fired by the French contained some poisonous substance purposely mixed with the lead when cast into bullets.

It is no longer a mystery why these wounds assumed such a character, and it is also perfectly clear that the surgeons themselves were at fault by introducing into the wounds septic germs from surgically unclean hands and instruments.

Even now, when not absolutely sure of our antisepsis, it is often very convenient to charge septic infection of wounds to intermeddling laymen or the omnipresent "old woman." In ordinary injuries we too frequently have good cause for such allegations. Who has not seen open wounds stuffed with cobwebs, half masticated tobacco quids from foul mouths, dirty feathers from ancient pillows, waste cotton, old rags, salves, poultices, etc., ostensibly to arrest hemorrhage or to promote healing, until the lesion has been made a hot bed of microbes requiring long and persistent treatment to effect their eradication and save life or limb. Not so with gunshot wounds. They are a mortal terror to the average laymen, and as a general rule he keeps hands off pending the arrival of a doctor. So that barring foreign matter, such as bits of clothing, etc., carried in by the bullet itself, if the wound becomes infected it is attributable in a majority of instances to the medical attendant himself, by failing to institute due antiseptic precautions at the outset. With such measures maintained there can be no objection, in fact it is proper and necessary for diagnostic purposes to make judicious use of the bullet probe, forceps or finger tip. But by the usual well known methods the hands must be made surgically clean, the instruments thoroughly boiled and the field of operation shaven and sterilized. In many superficial wounds the finger is the best probe. As Prof. Gross used to say: it has eyes in its tip and can both see and feel. If a metallic probe is used its porcelan tip should correspond in size to the caliber of the ball. A probe with a tip

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too small is more liable to make a false track by slipping between the facia or muscles.

I show you here a jointed probe devised by Dr. Senn and manufactured by Charles Truax, Green & Co., of Chicago. The tips correspond respectively to a twenty-two and a thirty-eight caliber bullet. Here also are the Senn forceps made by the same firm, which answer admirably all the requirements of a probe in many cases. It is an ideal bullet forceps, grasps firmly a bullet of any caliber and once fastened upon a ball of whatever size its grip never fails.

In the extremities, so long as the wound remains aseptic, even though it involves fracture and comminution of bone or injury of articulations, primary amputation is not indicated. If promptly and effectually protected from infection the wound assumes the character of a subcutaneous fracture, and with the same principles of immobilization and extension applied, will undergo the same process of repair, while the joint as a rule will retain much, if not all, of its accustomed function. If proof were longer needed to establish the inestimable value of antiseptic surgery it could readily be furnished in the history of gunshot wounds of the knee joint. Hennen, Larrey and Guthrie, who practiced surgery as it was known in their time, all agreed that these injuries demanded immediate amputation of the leg, otherwise the result would be fatal.

In the Russo-Turkish war, 1877–78, Reyher records eighteen primary aseptic cases of bullet wounds of the knee-joint, of which fifteen recovered with movable joints and three died, while Von Bergman gives fifteen cases of compound fracture of the knee-joint, with fourteen recoveries, three amputations and one death after amputation. Both Reyher and Von Bergman, so far as possible, treated their cases antiseptically, yet neither was able, owing to his surroundings, to carry out the measures fully, or it is more than probable that the mortality would bave been even less.

To-day primary amputation of a limb following gunshot wound would only be considered in cases where the vascular supply of the member had been so far interfered with as to

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destroy its vitality, a condition rarely or never met with in wounds inflicted by the smaller class of firearms.

In gunshot wounds of the abdomen, a different set of phenomena confronts the surgeon. The position of patient at time of receipt of injury; the probable course of the ball; whether it has traversed the abdomen antero-posteriorly, transversely or obliquely; whether in the upper or lower part of the abdomen—in short, the anatomical location of wound of entrance must all be considered. If penetration of the abdominal walls has taken place and the bullet is known to have passed beyond the peritoneum and within the abdominal cavity, probing is out of the question. If operative interference is indicated by the severity of the symptoms, laparotomy offers the only efficient method of relief. In many of these cases, however, there is an absence of fatal visceral lesions and the patient makes a good recovery under the sometimes excellent treatment of letting the wound itself alone, beyond the application of antiseptic dressings or any precautionary measures necessary to guard against its subsequent infection. A case which came under my care a few years ago will serve to illustrate this point:

CASE I.—Mrs. — stood directly in front of and four feet distant from her husband who sat on a chair examining his revolver. The weapon was accidentally discharged, the thirty-eight caliber bullet striking the woman fairly in the abdomen, one inch to the left and a trifle above the umbilicus; she fell to the floor. Her husband lifted her to her bed and then ran for a physician. I saw her within thirty minutes after the accident, and examined the wound. She had vomited more than a half pint of blood. There were severe symptoms of shock, feeble pulse, faintness, cold extremities, rapid sighing respiration, paleness, cold perspiration.

The symptoms were so apparent that no doubt remained as to the bullet having penetrated the abdominal cavity, and no attempt was made to probe. The wound was dusted with iodoform, and then covered with antiseptic gauze and absorbent cotton and the dressing held in place by strips of adhesive plaster.

While applying the dressing I noticed a convulsive movement in the hypogastric region, also the presence of a tumor, and the patient complained of severe pains there. I also ob-

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served blood oozing from the vagina. The mother of the patient who stood by informed me that her daughter was in the sixth month of pregnancy. A digital examination found the os uteri dilated to the size of a silver half dollar, the finger reaching without difficulty the head of the fetus. I immediately gave a hypodermatic injection of morph. and atropia ($\frac{1}{4}$–$\frac{1}{160}$) and repeated the dose in thirty minutes. The pain ceased and the symptoms of miscarriage, which seemed imminent, disappeared. The stomach was washed out with a weak boric solution, and the bowels with an enema of warm water followed with a quart of normal salt solution. I gave a very unfavorable prognosis and awaited developments with no little interest and anxiety. The patient made an almost uninterrupted recovery. In three weeks she was able to walk about her room, but for many months she complained of soreness and lameness in her back and of a prickling sensation in the soles of her feet and in the calves of her legs when standing or walking. As the fetus rose in the abdomen and the time of her confinement approached, the pressure of the uterus upon the wound, or rather the cicatrix, caused her constant pain, requiring opiates to control it. For three weeks prior to her accouchment she was confined to bed. The patient affirmed and the indications pointed to the fact that she had over-run the period of gestation fully two weeks, yet there was no sign of labor, although she suffered pain constantly, I therefore administered an anesthetic, dilated the womb, and delivered her of a healthy male child, the latter dying of diphtheria when three years old. The mother is alive and well to-day.

Recently the following case of gunshot wound fell under my own observation:

Case II.—Paul K., in handling a revolver, accidentally discharged it, the bullet entering the inner aspect of the left thigh just above the knee joint, taking a course downward and inward. An antiseptic dressing was applied and the man sent to the Wilkes-Barre City Hospital, where ineffectual efforts were made to locate the ball, although the X-ray was applied and an exploratory incision made along the outer aspect of the articulation. At the expiration of some two weeks he was discharged from the hospital. He could walk, but he was lame, and at intervals when walking a sudden excruciating pain would seize him in the joint, producing a sensation of nausea and faintness and at times causing him to fall. About a month after leaving the hospital he consulted me, the pain,

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as he stated, having become unbearable. After repeated examinations, I became convinced that the bullet was lying loose within the knee joint and that the cause of the sudden and severe seizures of pain were due to the ball slipping between the articular surface of the femur and tibia, producing impaction by the weight of the body in walking. By careful and prolonged manipulation of the joint, the bullet was finally located beneath the inner margin of the patilla and removed. It was six months before the man was entirely well, but there was at no time any suppuration, although the ball remained within the articulation from August 15th until September 30th. The joint lost none of its usefulness.

The fact of a bullet having penetrated the abdominal cavity does not necessarily predetermine laparotomy, and in not a few instances, as Senn has pointed out, death has resulted directly from the subsequent operation rather than from the gunshot wound.

Hydrogen gas, generated from pure zinc and sulphuric acid, introduced into the rectum, is regarded by Senn as an unfailing diagnostic test in determining the presence or absence of intestinal perforation. Under a pressure of two and one-half pounds to the square inch the gas passes through the illeo-cecal valve into the small intestines. Auscultation detects a peculiar gurgling sound as the gas is forced through the valve. Perforation of the rectum or colon permits the gas to escape into the peritoneal cavity before reaching the small intestine, as the illeo-cecal valve offers sufficient obstruction to force it there, in which event the sound of the gas passing through the valve is not heard. In either case, if the abdominal walls are thin, or more certainly if the external wound has been laid open down to the peritoneum, the gas escapes through the rent in the gut and is easily detected. This being determined, but one course is open to the surgeon: alleviate shock, careful preparation of patient, anesthesia and laparotomy under strict antisepsis, ligation of all bleeding vessels, careful research lest there be multiple perforations and one or more be overlooked, closing of each rent with silk suture, abstraction of ball if practicable, flushing out abdominal cavity with warm normal salt solution, drainage if necessary, closure of wound,

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antiseptic dressings, rest, opiates, sustentation by hypodermatic medication, withholding all food except sips of hot water for first twenty-four hours, then carefully selected diet.

It is assumed that in any given case the totality of symptoms presented will determine the surgeon in arriving at a decision whether or not operation is justifiable as offering any chance of prolonging or maintaining life.

In penetrating gunshot wounds of the thoracic cavity, radical operation is seldom required. If the heart or either of the principle thoracic blood vessels has been wounded, the victim will succumb from acute anemia in less time than would be required to prepare him for operation. Pulmonary collapse and blood clot will in many instances arrest hemorrhage and save life. In gunshot wound of the lung, the wound remaining aseptic, recovery ensues. The supervention of septic infection calls for aspiration, rib resection, drainage, &c.

Where a bullet has penetrated the skull, traversed any portion of the brain substance and escaped by a wound of exit, shaving and disinfection of entire scalp is indicated, removing of spiculae of bone, gauze drainage and antiseptic dressing of entire scalp. The ball having lodged in the brain substance great care must be observed in an effort to locate it by probing, which, if successful, may warrant the enlargement of the wound of entrance or a counter opening to effect its removal. We have reason to believe that at no distant day the perfection of the X-ray in locating these missiles will render the probe obsolete and prove of inestimable value to the surgeon in these as in so many other surgical conditions.

Omitting details, such in brief is a rude skeleton outline of the necessary steps to be pursued in the modern treatment of gunshot wounds. As a matter of fact a more rigid conformity to every detail is demanded of the civil practitioner than is required of the military or hospital surgeon. Mistakes made by the latter in the excitement during or subsequent to battle, or in the crowded military hospitals where the victims of gunchot wounds are surrounded by stern men of war, far from the loving sympathy of wife, father or mother, are passed unnoticed. If the wounded die, as a result of injudicious treat-

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ment, he is supposed to occupy a hero's tomb, while the surgeon's reputation is unaffected.

I do not mean to insinuate that the work of the capable, conscientious military surgeon is less skillful or less successful than that of the civil practitioner. Possibly the results obtained by the former are even better than those of the latter, for the military surgeon is unhampered by the interference of friends of the patient, and he is left unrestricted to institute whatever measures his judgment may dictate. With us it is different in very many instances. With what frequency is our treatment subjected to severe and undeserved criticism by the laity, and also in judicial proceedings, the recollection of every member of this society, as well as our courts of record, bear testimony. Well grounded indeed must be that physician's reputation, who, in a given case of gunshot injury of the head, with a bullet lodged in the brain, and counter opening indicated, fearlessly trephines the skull in the hope of relieving his patient. Should the operation result in the extraction of the ball and the recovery of his patient it may add laurels to the doctor's brow; but if the patient die and the case is made the subject of judicial investigation, fortunate indeed will that physician be if the charge of manslaughter is not directly or indirectly laid at his door.

Better perhaps that I should stop right here and hand this subject over to the able physicians appointed to discuss it; but the subject of gunshot wounds is so intimately connected with the lowering war clouds that have so recently overspread our nation, and the overwhelming bereavement that has in consequence of that other twin evil, the fever plague, visited so many of the once happy homes of our beautiful valley, and whose gaunt shadow even now stands knocking at the very threshold of my own door, threatening the life of a beloved son, that my soul is filled with horror and sorrow as I contemplate the ravages of war, and I can scarcely forbear expressing the thoughts that arise within me.

As a boy, some ten years of age, crouched beside the fireplace in the old farm house, I remember most vividly listening to my father reading the account of the firing on Fort Sum-

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ter by the rebel hosts, and day by day for four weary years thereafter the daily papers told the story of the bloody carnage of the great Civil War. Sometimes my father's voice would waver and he would brush away a tear as he read the name of a neighbor, friend or relative who had fallen in the conflict, and even to-day in that rural district, as you may see in nearly every hamlet throughout our beloved and re-united land, aged and infirm parents, with whitened locks and feet tottering on the brink of the grave, still wait and watch for "the boy who went to the war." Widows mourn for husbands whose life-blood watered the sands of southern battle fields, while thousands of orphans, bereft of a father's love and assistance, were left to fight the battle of life alone, or have been thrown as proteges upon the mercy of our government for subsistence and education in the soldiers' orphan schools.

Of the men who did return, it is my firm conviction, based upon an experience of thirteen years' service in the Pension Department of our government, that but a frightfully small percentage came back to their homes with unimpaired health. By far the greater majority of those who survived to tell the story of the Rebellion, took up once more the burden of civil life with shattered health, due to wounds received in battle or to the equally disastrous effects of the various diseases induced by the privations, hardships and exposure incident to a soldier's life. Just what proportion of lives were sacrificed or shortened as a result of army experience it would be difficult to determine. The ranks of the veterans are rapidly becoming decimated by the lapse of time, but our enormous pension roll and the old soldiers who hobble past with armless sleeve, or with crutch or cane, tell in mute but unmistakable language the indescribable horrors of war.

The following statistics of some of the principal battles of the Civil War may give an idea of the havoc wrought:

Gettysburg, killed, 3,070; wounded, 14,497; missing, 5,434; total, 23,001. Spottsylvania, killed, 2,725; wounded, 13,416; missing, 2,258; total, 18,399. Wilderness, killed, 2,246; wounded, 12,037; missing, 3,383; total, 17,666. Antietam, killed, 2,108; wounded, 9,549; missing, 753; total, 12,410;

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Chancellorsville, killed, 1,606: wounded, 9,762; missing, 5,-919; total, 17,287. Chickamauga, killed, 1,656; wounded, 9,749; missing, 4,774; total, 16,179. Cold Harbor, killed, 1,844; wounded, 9,077; missing, 1,816; total, 12,737. Fredericksburg, killed, 1,284; wounded, 9,600; missing, 1,769; total, 12,658. Manassas, killed, 1,747; wounded, 8,452; missing, 4,263; total, 14,462. Shiloh, killed, 1,754; wounded, 8,-408; missing, 2,885: total, 13,047; Murfreesborough, killed, 1,730; wounded, 7,802; missing, 3,717: total, 13,249. Petersburg, killed, 1,688; wounded, 8,513; missing, 1,185; total, 11,386.

In his essay entitled, "Disabillities of Old Soldiers," the late Dr. Crawford gives us the following figures: Number of men enrolled in the Federal armies during the five years' war, 2,358,871. Of this number 44,238 were killed in battle, and 49,205 died from wounds and injuries, making a total of 93,-410 who died more or less directly from wounds. The total number who died from disease and unknown causes aggregated the enormous number of 210,926, making a total loss from April 15, 1861, to June 30, 1865, of 304,336 lives. The number of men discharged for disabilities received in the service was 285,545, aggregating in killed and disabled, 589,879 men. Besides these there were 371,541 non-fatal wounds. It thus appears that 961,420, or about four-ninths of the total number of the Federal army, were killed, wounded, or so disabled by disease as to require their discharge from the military service.

The final scene in that great tragedy of tragedies was enacted when the gunshot wound inflicted by Booth, the assassin, laid low in death the martyred Lincoln, whose blood, rising like incense from the sacrificial altar of this great nation, stilled the tumult of rage and hate that had so long possessed our people.

Finally, when the smoke of battle had cleared away, and peace had once more spread her white wings over our country, men in cooler frame of mind, for the first time, began fully to realize the awful slaughter and havoc wrought in the prosecution of that sanguinary strife; and, standing agast and horror-

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stricken at the scene presented, many prophesied, all hoped and prayed that our nation might forever afterwards be spared the devastating effects of another war.

But scarcely has a generation passed away and we find the sword again unsheathed, while the clash of contending fleets, the roar of cannon, and the defiant yells of opposing hosts are borne upon every breeze, while once again the life-blood of the noblest and best of our young American manhood is poured out to redden the turbulent waters of the angry sea that opens its caverns to offer a sepulchre to the slain, or the crimson flood mingles with the mire of pestilential tropical swamps, with no stone to mark the final resting place of our fallen heroes.

But what has all this to do with the subject of "gunshot wounds?" Much; everything. We do not underestimate love of country; we do not place a discount upon valor, patriotism or heroism. Both the Civil and the Hispano-American wars were, we believe, perfectly justifiable as viewed by the people of the North in the former and in the latter by the entire American republic. The chief object sought in both was to break the shackles which ignorance and despotism, relics of the darkest ages, had forged and fastened upon millions of human slaves, and to redeem them from a thraldom that was worse than a living death. The history of the black race of America, since the pen of the immortal Lincoln, backed up by the bone and sinew of the North, gave them emancipation from serfdom, has amply proven that the end justified the means employed to secure their freedom, and no other recourse appearing at that time whereby to secure their release from slavery, the ransom of a million heroes is after all a small price to be paid in order that countless generations of black men yet unborn shall have vouchsafed to them the privilege of walking God's footstool free men and free American citizens. That the result in our present struggle will also terminate equally as propitious cannot be doubted.

Revolutions must and will continue until, in the remotest parts of the earth, tyranny, oppression and slavery, wherever found, shall be destroyed, the tyrant's power broken, and the

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oppressor, whether czar, emperor or king, is hurled back into the chaos and oblivion which is his just reward.

To-day, as never before, the down-trodden and the oppressed of every clime are turning eager, anxious eyes toward liberty-loving America. Nor will the people of America prove recreant to their trust or indifferent to the appeal until the last fetter is loosened and the golden text of American freedom, —"all men are born free and equal"—verified.

But shall not we, whose mission it is to heal, not inflict wounds; to restore the shattered limb, not to deal the blow that produced the injury; to prolong life, not to destroy it; shall not we as members of a profession whose code of ethics teaches, and whose avowed mission in life is to relieve the distressed and promote the temporal welfare of mankind, set our faces strongly against war, exerting whatever influence we may possess in bringing about a just settlement of all controverted questions without the arbitrament of the sword, the dynamite bomb and the rifle.

We bestir ourselves to eradicate or prevent all other forms of contagion that bring to humanity disease and death. Why not oppose war? "War is a pestilence," "war is hell," "war is brutal though legalized murder." Such are some of the definitions of war as laid down by soldiers, statesmen, and poets. Yet no soldier, no statesman, no painter, has ever been able to portray by word or pen or brush the cruel, the devilish, the hellish miseries of armies of men engaged in mortal combat or massed together upon the tented field.

True, in the clash of arms, the rattle of artillery, the groans of the wounded and dying, mingled with the strains of martial music, there seems to come an unaccountable fascination that during battle transforms men into demons, inducing a species of satanic anesthesia, if you will allow the term, that, for the time being, renders the soldier oblivious to the ordinary instincts of humanity or the sensations of pain and anguish; and hence we see the trooper with both arms shot away and a bullet in his thigh laughing boisterously as he is borne to the rear on Santiago's bloody field. The soul-stirring strains of the Star Spangled Banner peal forth from the throats of the

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thinned ranks of the gallant 71st New York as they charge up the precipitous heights of El Caney, while the wounded heroes, lying prone upon the ground, their life-blood ebbing from gaping Mauser wounds, join in the chorus; or Findlater, the Highland piper, with both feet shot away, props himself against a stone and sends forth the cheering notes from his bagpipe to urge his Scottish comrades on to victory in the jungles of India.

The conflict ended, the soul of the humane commander is filled with sorrow, possibly remorse, as he contemplates the brutal and wholesale butchery of human beings, and we can but wonder that there are not more men of the Phillips class, who, when his men sent up the exultant shout of victory sternly yet pityingly gave the command that will travel down the pages of history: "Stop cheering boys, the poor devils are dying."

"The victor looks over the shot-churned wave
At the riven ship of his foeman brave,
And the men in their life-blood lying;
And the joy of conquest leaves his eyes,
The lust of fame and battle dies,
And he says: 'Don't cheer; their dying.'

"Cycles have passed since Bayard the brave—
Passed since Sydney the water gave,
On Zutphen's red sod lying;
But the knightly echo has lingered far—
It rang in the words of the Yankee tar
When he said: 'Don't cheer; they're dying.'

"Why leap our hearts at our Hobson's name,
Or at Dewey, who battled his way to fame,
Our flag in the far east flying?
The nation's spirit these deeds reveal,
But none the less does that spirit peal
In the words: 'Don't cheer; they're dying.'"

In war the surgeon is regarded as a man of peace, which may account for the fact that he possesses no rights which petty officials are bound to respect. Nor need he anticipate promotion or hope to see his name enrolled upon the scroll of fame among his country's heroes.

Why should it be? What right has he to expect to live in

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the memory of his countrymen? His mission is to save, not to kill, but this is not heroism. With sleepless eyes he stalks through the hospital tent, throughout the silent watches of the livelong night, cheering the sick or soothing the dying, but this is not heroism! He refuses his own food and carries it to a sick, half famished soldier to save the latter from death; but that is nothing, only a sign of weakness. With eyes swollen and bloodshot from watching and anxiety, he weeps over the miseries of his suffering comrades, but, bah! this is not heroism—a woman could do that. Overcome by exhaustion, enfeebled by exposure, his nervous system shattered, he finally falls out of the ranks, himself stricken by the plague, but this is not heroism; and if he dies it is probable his relatives will be required to bear the financial burden of transporting his poor body home and consigning it to a humble tomb over which no ensculptured monument tells of heroic achievement upon the battlefield. Fortunate is he if a plain slab marks his final resting place, where possibly for a generation his kindred may drop an occasional flower.

In the last war in India, General Woodhouse was badly wounded. A bullet struck him in the thigh, passed down the leg, shattering the knee and lodged. The surgeon applied the Roentgen ray. located the ball and proceeded to extract it. In the middle of the operation the Afridis crept up and blazed into the tent, sending thirteen shots through the canvas. Did the surgeon cease his work and run? By no means. The antiseptic operation went on as if nothing had happened, and the patient made a good recovery.

Says the London Lancet: "Surgeon Capt. Beyts arrested hemorrhage under a hot fire, and Sir William Lockhart, speaking of the incident, said that no man ever better merited the reward of the Victoria Cross than he. He got nothing."

Another instance: In a night attack, Lieutenant Ford was dangerously wounded in the shoulder. The bullet cut an artery and he was rapidly bleeding to death, when Surgeon Hugo sprang to his aid. He was under a hot fire. There was no cover of any sort. It was dark. At the peril of his life the surgeon struck a match and examined the wound.

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The match went out amid a splutter of bullets which kicked up the dirt all around, but by its uncertain light the surgeon discovered the nature of the wound. The officer had already fainted from loss of blood. The doctor seized the artery and as no other ligature was to be had he remained under fire for three hours holding a man's life between his finger and thumb. When it seemed that the enemy were breaking into camp he picked up the still unconscious officer in his arms, and without relaxing his hold upon the blood vessel, bore him to a place of safety and nursed his patient back to health and life. For many hours after his trying ordeal Surgeon Hugo's arm was paralyzed from cramp, the effect of his prolonged exertion in compressing the artery.

If such men are not heroes, what are they? When Dr. Gibbs, of New York, dropped dead on the field of Santiago, with a Mauser bullet through his brain, I believe the gates of the New Jerusalem swung just as wide for him as they ever will for Toral or Shafter. I believe that the chorus of angel voices will echo and re-echo just as long and loud and as joyously when Clara Barton traverses the streets of gold, and presents herself before the great white throne, as it did when Mary and Elizabeth, queens of England, entered within the pearly portals.

I believe that good St. Peter hastened to extend as joyous a greeting and as sincere a welcome to that good and pious Catholic priest who gave up home and friends, health and life, to go and live among a colony of lepers that he might minister to their sufferings and by his presence cheer their living death as he did to Wellington, Napoleon or Washington.

Two great professions, theology and medicine, teach or profess to teach, "Peace on earth, good will to men," as practiced by the Man of Galilee nineteen hundred years ago. When we are joined in the good work by the profession of lawmakers and law-expounders, a combination will have been formed potent in hastening the millennial dawn, when "They shall beat their swords into plowshares, and their spears into pruning hooks; nation shall not lift up a sword against nation, neither shall they learn war any more."

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WATER SUPPLY.

BY WM. H. DEAN, A. C., E. M., PROFESSOR OF CHEMISTRY AND PHYSICS IN HARRY HILLMAN ACADEMY, WILKES-BARRE, PA.

READ SEPTEMBER 21, 1898.

Mr. President and Gentlemen of the Luzerne County Medical Society:

In presenting this paper on water supply, I desire to state at the outset that I make no claim to originality for the matter herein contained, but have drawn freely upon every source that might shed light upon the subject in question, and have made use of the language of the authorities consulted whereever I thought it might aid in presenting the subject more clearly.

The views expressed and the conclusions reached are in harmony with the present state of our knowledge of this question.

I shall attempt to give only a brief survey of the different kinds of water that may compose a domestic supply, the various impurities contained therein, their effects, and the methods of determining their presence.

Because of the magnitude of the subject, I have omitted entirely the artificial purification of water.

Water is absolutely essential to all forms of organic life; without it, the animal and vegetable kingdoms would cease to exist, and our beautiful world would only be a globe of barren rock. We find from the history of the earliest ages that men took up their places of abode in the neighborhood of springs or running streams; or, when this was impossible, selected some spot where water might be easily obtained by digging wells; and we read in the book of Genesis of the herdsmen of Gerar striving with the servants of Isaac for the possession of wells he had dug. As people began to gather themselves together in great centers of population, these primitive sources of supply proved inadequate, and we find them building huge basins or storage reservoirs to catch the rain as it fell and store it up for future use; or in some cases they were filled

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with water brought from a distance. Some of the greatest engineering structures of ancient times were the huge aqueducts by which the people were supplied with water from distant and unpolluted sources, and the care exercised by a people to secure and maintain a supply of pure water may be taken as a measure of their civilization.

Ancient Rome was supplied with ten or twelve aqueducts, bringing to the people an abundance of water from springs and mountain streams. The total length of all the aqueducts supplying the city was 381 miles, and the daily supply has been calculated to be 332,306,624 gallons, over 332 gallons per capita for a population of one million. At the present day, four of the ancient aqueducts still supply the city with water. There are still to be seen, on the site of ancient Carthage, eighteen reservoirs, each about one hundred feet long, twenty feet wide, and twenty feet deep. They lie in two rows and empty into a common gallery situated between the rows. Drinking water was supplied to ancient Carthage from a spring sixty miles distant from the city, by means of a conduit that in its course cut through mountains by tunnels, and crossed valleys by huge aqueducts, in one instance 125 feet high.

How different from this is the condition of things in India; there no care whatever is used in selecting a water supply. *"The drinking water is obtained from wells, from tanks or artificial ponds, and from the streams of the country. The tanks are merely excavations in the ground in which water is caught and stored during the rainy season, to be used in the dry, and consequently nothing more than stagnant pools. These reservoirs serve as a tub for washing clothes, a tank for personal bathing, and as a supply of water for drinking purposes.

"The Hindoo will not use a latrine, but in the cities digs a hole in the floor of his dwelling, and in the country seeks the hillsides and banks of streams when compelled to obey the calls of nature. The vicinity of thickly populated districts, and the banks of the tanks and streams are in consequence

*Mason.—Water Supply, chemical and sanitary.

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reeking with filth of the worst sort, that is washed into the public water supply with every rain fall. When we consider such a condition of affairs, together with the misery of the pilgrims, their poverty and distress, and their crowding together under the most unsanitary conditions imaginable in cities and towns that contain some temple or shrine, the object of their fanatical devotion, and remember that the waters of the rivers in which they dispose of their dead is drank as a religious rite, we cease to wonder at the rich harvest annually reaped in that country by cholera."

"Waters may for convenience, be divided into four classes; rain water, surface water, ground water, and deep seated water.

*Rain water is water precipitated from the atmosphere under any conditions, and therefore includes rain, dew, snow, frost and hail. Rain water collected in the open country at the later period of a prolonged snow or rain is the purest form of natural water obtainable, and leaves on evaporation but little residue, consisting of ammonium compounds and organic matter. The water that falls during the first period of a shower dissolves the ammonium compounds in the air and carries down with it the particles of dust and myriads of minute organisms, living and dead, that may be floating in the atmosphere. While a prolonged rain will wash the impurities from the atmosphere, yet as storms are always accompanied by more or less wind, fresh portions of air are constantly rushing in, so that rain water as collected is never quite pure. Rain water collected in thickly populated districts is usually quite impure, and that collected near the ocean contains an appreciable amount of chlorides. Since rain water, then, is always more or less impure, those who rely upon cisterns for their supply of drinking water rest in a false sense of security, as the conditions under which the water is collected and stored are well adapted to the growth and development of such organisms as may be present.

Surface water is water that is collected on the surface of the ground in free contact with the air, into seas, lakes,

* Leffman.—Examination of Water.

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ponds, or streams. Such water contains more suspended and dissolved matter than rain water, the amount depending on the profuseness of the rainfall and the nature of the ground over which the water flows before being collected. The streams flowing sometimes with great rapidity from the higher levels of a watershed, gather into large streams as they descend, and their movement becomes slower, causing a deposition of some of the suspended matter. Sometimes waters from widely different sources or from districts far removed, unite, causing a decided change in the nature and amount of the dissolved matter present. An example of this is seen in the change in the character of the water of the Susquehanna river after entering the Wyoming valley. This stream, coming through a limestone district of New York State, dissolves and holds in solution a certain amount of carbonate of lime, but upon reaching our valley it receives a certain amount of mine water, which contains sulphate of iron and free sulphuric acid. The result is a neutralization of the acid, the precipitation of part of the iron and some of the calcium, so that after a flow of only a few miles the water is appreciably softer than it is at Campbell's ledge.

The exposure to light and air, which surface water undergoes, results in an absorption of oxygen, accompanied by the oxidation of organic matter and a loss of carbon dioxide.

Subsoil or ground water is water that penetrates the soil to various depths, depending upon the porosity and arrangement of the strata, descending as a rule until it reaches a stratum that is impervious or nearly so, where it accumulates. In passing through the upper layers of the soil it dissolves mineral matters and organic substances, and becomes impregnated with micro-organisms from the soil, through the agency of which decided and important transformations are wrought in the organic matter present. The water, as it accumulates on this impervious stratum, may follow the incline of the stratum until it reaches a fissure through which it will pass and continue its downward course, or it may emerge and form a spring.

Subsoil waters differ greatly in composition, but as a rule

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they contain little solid matter, and are comparatively free from organic substances.

In populated districts, however, a decided change is wrought in the character of the water by its admixture with water containing organic substances in various stages of decomposition. It is the organic matter containing nitrogen that is of chief importance. To this class of compounds belong all tissues intimately associated with vital processes, also many excretory products. Owing to the instability of these compounds, as soon as the life process ceases decomposition begins, partly by oxidation, and partly by splitting up into simpler compounds. These changes are caused in most cases by the presence of minute organisms. Among the products noticed in the earlier stages of decomposition, are compounds resembling in their properties the organic bases or alkaloids, but are more susceptible of decomposition. They are present in small amount, but are frequently very active in their physiological effects. From the result of recent investigations, it is not improbable that the pathogenic properties of many organisms is not due to the direct action, mechanical or otherwise, of the organisms themselves, but to these alkaloidal substances which they produce and excrete. These substances as a class are called ptomaines; they always contain nitrogen.

The ultimate products of decomposition depend largely upon circumstsnces. When organic substances containing nitrogen are exposed to the action of powerful oxidizing agents, as potassium permanganate, or chromic acid, a part of the nitrogen is converted into ammonium compounds.

A similar action takes place in all waters, but a considerable portion of the organic matter may be still further oxidized, giving rise, in the presence of mineral substances, to the formation of nitrates and nitrites, especially the former. This change is called nitrification, and is brought about by the action of minute organisms, the habitat of which does not extend more than a few yards below the surface of the earth. Arable soil containing much humus is the medium in which they grow most luxuriantly and accomplish their most important function.

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Water rich in sewage contains many of these organisms.

The conditions under which nitrification takes place have been studied by a number of observers, but considerable research is still required to put the subject on a secure basis. It is known, however, that some substance capable of neutralizing acid is necessary to its continuous action. It is probable that the nitrifying action is exerted only on the ammonia which is formed from the organic matter. Nitrites exist as an intermediate compound betweeen ammonium compounds and nitrates, nitrates being the final product of this action.

Several species of bacteria have been isolated possessing active denitrifying powers. These bacteria, by their action, cause a partial reduction of nitrates with the formation of considerable quantities of nitrites.

In the presence of actively decomposing organic matter, as sewage, complete reduction, even to nitrogen, may occur. Several species of bacteria have been described in the sewage of Lawrence, Mass., which rapidly reduce nitrates to nitrites.

Deep Seated Water.—Shallow wells, and springs trickling out of the hillside, are classed as ground water. But sometimes the water reaches the surface in great volume, at a temperature varying radically from that of the subsoil, and holding in solution mineral substances differing widely in character from those of the immediate neighborhood. Such water s always from a distant source.

Suppose an outcrop of a porous stratum on a rainy upland, encased between strata impervious to water and having a gradual dip; then let them be broken by a geologic fault or worn through by erosion at some point far from the outcrop, and we have the conditions favorable for a deep seated spring. The rain falling on the surface passes down through the porous stratum, taking up soluble material on the way, and would escape at the point where the strata are broken or eroded. To this class belong most of the noted mineral springs of the country; but their water is medicinal rather than potable.

For our present purpose, however, we have to deal with surface and ground waters, as it is to these we are indebted for our domestic supply.

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The value of pure water and the danger arising from drinking polluted water has long been recognized.

Hippocrates, four hundred years before our era, wrote on the subject of pure water, and advised boiling and filtering polluted water before drinking—advice that is to-day considered well worth heeding. He also claimed that drinking raw swamp water produced enlargement of the spleen. During the middle ages it was observed that water became poisoned by being passed through lead pipes.

By pure water is meant potable water, or water fit to drink, since pure water, in the strict sense of the term, is an artificial product and is never found in nature.

The first and most important use of water being for drinking purposes, it is to this aspect of the subject we will direct our attention.

The water supplied to communities is usually river water, pumped from a running stream, water caught on high ground and stored in reservoirs, or water obtained from wells driven in porous soil in the neighborhood of a river or some other body of water.

As large centers of population are usually found along rivers, owing to the advantages afforded for manufactures and commerce, river water is always contaminated with mill and factory wastes, and the sewage from the towns along its banks, in addition to the washings from the country through which the stream flows.

Stored waters may be gathered from water sheds wholly or partly under cultivation, and supporting numbers of families; the water may be stored in reservoirs not properly cleaned, and may be exposed to contamination in flowing from the storage reservoir to the distributing reservoir.

Wherever water is stored, more or less vegetable growth will occur in the reservoirs at certain seasons of the year, sometimes giving the water a color and imparting to it a disagreeable odor and taste. These may be partially removed by allowing the water to run in an open stream where it can be broken up by flowing over stones, thus affording an opportunity for aeration. Much has been said and written on the

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self-purification of water in running streams, and many investigations have been made for the purpose of determining the extent of such purification. Without going into details and wearying you with data and figures, it is sufficient to state that the benefit derived from such flow has frequently been overrated. It is true that a badly polluted water is often greatly improved during a flow of a few miles, by virtue of the oxidation of the organic matter. It is found, however, that this self purification proceeds readily only to a certain extent and then goes on very slowly or ceases entirely, and that the rapidity with which the purification proceeds is proportionate to the extent of the pollution, becoming less and less as the water approaches a degree of purity that would recommend it for domestic use. If the water contain pathogenic bacteria, it is not safe to rely at all upon the probability of their removal through this self purification of the stream, for some species, as the typhoid bacillus for example, will live for thirty days in polluted water, and for a period of seven to fourteen days in ordinary potable unsterilized water.

As the appearance of a water, its color or taste, cannot be taken as a criterion of its potability, various methods have been devised for determining the character and amount of impurities a given water may contain. The three methods now in use, or rather the three divisions of the method used, may be classed as the chemical, microscopic, and bacteriological. Sometimes a single one of these examinations will be sufficient, and sometimes all three are required. We will consider them in their order.

The subject of water analysis is one concerning which many peculiar ideas are entertained. The popular conception of a sanitary chemist is that he is a sort or wizard, equipped with an electric eye by which he can merely look upon a few tablespoonfuls of water contained in a dirty bottle stopped with an old rag or piece of paper, and tell whether it is fit to drink. He must, however, be kept in total ignorance of the source from whence came the water upon which he is to operate, that his opinion be not biased or his judgment warped thereby. Furthermore, he need take no thought concerning what he

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shall eat or wherewithal he shall be clothed, and consequently should make no charge for his services.

A water analysis, strictly speaking, is not an analysis at all, but a series of experiments conducted with a view to aid the judgment in passing upon the condition of a water. If a chemist is called upon to make an analysis of an iron ore, a sample of pig iron or steel, he can determine the sulphur, carbon, silicon, phosphorous, iron, &c., and from this analysis obtain such information as is desired, regardless of where the sample came from; but in passing upon the quality of a water, a knowledge of the source from which it comes is essential.

It is held as a golden maxim by one of the best authorities in water analysis never to pass judgment upon a water, the history of which is not thoroughly known; and the more nearly this can be lived up to, the fewer will be the mistakes in reporting on the condition of water. An example or two will suffice to make this point clear.

A ground water in some parts of New York State, or from certain parts of Florida, would show the presence of a large amount of chlorine, while a like chlorine content in the water of this region would indicate sewage pollution. Again, an amount of free or albuminoid ammonia that would excite no alarm were it known that the water could not be reached by sewage pollution, would be sufficient to condemn the water were it known that this contamination by sewage matter was possible.

The chemical examination of water has for a long time commanded attention, and processes which were crude and subsequently proved inadequate to present the information desired have, through the patient researches of many workers, been supplanted by others that seemed better to afford a true indication of the condition of the water in question. The process at present universally employed is that known as the albuminoid ammonia process, worked out by Wanklyn, Chapman and Smith, and which depends upon the oxidation of organic substances by means of a boiling alkaline solution of potassium permanganate. It was probably called the albumi-

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noid ammonia process because the first experiments were made upon albuminous substances.

The substances determined in making a chemical examination of water are the free ammonia, albuminoid ammonia, nitrogen as nitrates, nitrogen as nitrites, chlorine, oxygen consumed, i. e. taken up by boiling ten minutes with an acidulated solution of potassium permanganate, total solids on evaporation, loss on ignition, and in some cases the hardness. The free ammonia is present as the result of the decomposition of organic matter containing nitrogen; it frequently occurs in rain water, being dissolved out of the air by the rain. The albuminoid ammonia affords a measure of the undecomposed organic matter present. Valuable information is often obtained by noting the rapidity with which the albuminoid ammonia is given off. If it is evolved rapidly, the greater portion of it coming over with the first portions of the distillate, the organic matter is in a state of active putrefaction, while if it is given off gradually, the organic matter is in a fresh condition. A determination of the chlorine is important as indicating sewage pollution. To be of value, however, a knowledge of the normal chlorine of the locality is necessary. Nitrates are present in water as a result of the oxidation of organic matter through the agency of nitrifying organisms. Two theories are advanced to account for the presence of nitrites in ground water, one is that it is due to the reduction of nitrates, and the other is that they are present as an intermediate product in the oxidation of ammonia to nitrates. In either case the presence of nitrites indicates recent contamination by organic matter, and, if present in any quantity, afford sufficient ground for condemning the water. Valuable information is sometimes obtained by igniting the residue left on evaporation, and noting the appearance, odor, &c.

An experienced observer can in this manner obtain a very good idea of the residue.

But aside from the impurities that are the result of the decomposition of organic matter, water may be impregnated with minute organisms, some of which play a very active part in bringing about this decomposition. These micro or minute

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organisms may be either animal or vegetable, alive or dead. Some can be studied by the microscope alone, while others require the use of special culture media, and it is by the observation of the growths in such media, their reactions, &c., rather than by their microscopic appearance, that a knowledge of them is obtained.

The first systematic microscopic examination of water from a sanitary standpoint was made by Hassal upon the London supply derived from the river Thames. His manner of making these analyses is not definitely stated, except that a wine bottle was filled with the water and allowed to stand until the heavier particles had settled, and a drop of the sediment was then examined.

Until the year 1881, microscopic examinations always included the bacterial organisms. Since that time the culture methods introduced by Koch have drawn attention from the micro-organisms and fixed it upon the bacterial organisms.

The method at present employed in making a microscopic examination of drinking water is that devised by Sedgwick and Rafter, and is briefly as follows: A convenient quantity of water is first concentrated by filtration through fine white sand, crushed quartz, or precipitated silica. The filtering tube used is a glass tube about 2″ in diameter, having a body about 10″ long and drawn down to a neck ½″ in diameter and about 2½″ long. This is stopped with a perforated rubber cork, on the end of which is placed a piece of silk bolting cloth; sand is then poured into the neck of the tube to the depth of about three-fourths of an inch. The sand must be of a size that will pass through a sieve having sixty meshes per inch, and be retained by one of 120 meshes per inch, this size having been found best adapted to allowing a ready filtration of the water and at the same time retain the micro-organisms present.

Ordinarily 250 c. c. of the water to be examined are passed through the filter, and the sand is then washed out into a test tube with five c. c. of distilled water; this is thoroughly shaken and the sand allowed to subside, which it quickly does; then 1 c. c. of the liquid is removed with a pipette and placed on a

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glass slide on which is a cell, made by cementing to the glass a brass rim one mm. thick and fifty mm. long, by twenty mm. wide, inside dimensions, and therefore holding exactly one cubic centimeter. A cover glass is then floated over the cell and the contents examined with a half inch objective and a No. 3 or 4 eyepiece fitted with an eyepiece micrometer ruled in squares and so adjusted that it covers a field 1 mm. square. Each reading then gives the number of organisms in 1 cu. mm. Twenty readings are taken on different parts of the cell. The total number of organisms counted will then be $\frac{1}{50}$ of the number in the cell, or, since the cell contains $\frac{1}{5}$ of the number in the water taken, we have counted $\frac{1}{250}$ of the number of organisms in the water or the number in 1 c. c.

The micro-organisms occurring in water are classified as algae, cyanophyceae or blue-green algae, diatomaceae, fungi, infusoria, rhizopoda, crustaceae and vermes. Besides these, note is taken of such miscellaneous matter as mites, vegetable tissue, starch granules, sponge spicules, &c. Without going into a discussion of these classes of organisms, I will merely refer to the effects produced by the presence in water of certain genera.

*It is commonly supposed by those who have not investigated the subject that the disagreeable odors and tastes of drinking waters are due to the decay of organic matter and must therefore be dangerous or indicative of danger to health. Extended investigations along this line, however, have established beyond doubt that many of these odors and tastes of surface waters are due not to decay, but to the presence of microscopic organisms, either animal or vegetable. This does not seem strange when we reflect that the larger plants possess characteristic odors and tastes. The following are some of the most prominent genera affecting the odor and taste of water. Among the diatoms, the genus asterionella, when present in great numbers, imparts a characteristic aromaticodor strongly resembling the odor of geranium. The genera meri-

* D. D. Jackson on The Odors and Tastes of Surface Waters, with Special Reference to Anabæna.

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dion and tabellaria also impart an aromatic odor to water, but less marked than the odor of asterionella.

There are several genera of cyanophyceae, or blue-green algae, that produce characteristic odors, the most prominent being anabaena, which imparts a mouldy, grassy odor, and when decaying, a strong pig-pen odor. Volvox, pandorina and eudorina, of the chlorophyceae or pale green algae impart a faint fishy odor. Uroglena, one of the infusoria, gives rise to a strong fishy, oily odor and taste, often giving the impression that there are dead fish in the reservoir. This odor is due to an oil secreted by the infusoria and is more marked in water as drawn from the hydrant than at the storage reservoir; this is occasioned by the organisms being broken up by the pressure and flow of the water through the pipes, thereby permitting the oil globules to escape. Synura, another infusoria, gives to water the odor of ripe cucumbers.

Analysis of the gas given off from decomposing anabaena have revealed only the merest trace of hydrogen sulphide, but the gas gave a strong reaction for sulphates, after being passed through bromine water, thereby showing the presence in the gas of volatile sulphur compounds which were only partially decomposed, and yet were in a condition to produce highly offensive odors.

Analyses that have been made of the gelatinous material resulting from the decomposition of anaboena showed the presence of a large amount of sulphur and considerable phosphorous. This sulphur, it has been shown in the case of oscillaria, is derived from the sulphates dissolved in the water.

It is evident from these investigations that the odor of decomposing blue-green algae is not due to the evolution of hydrogen sulphide, but to the breaking up of highly complex organic compounds of sulphur and phosphorous. The odor is doubtless more highly offensive because of the high percentage of nitrogen present. It is found throughout the organic world that the most offensive odors of decay are produced by the decomposition of highly nitrogenous compounds containing sulphur or phosphorous.

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A distinction must be made between the odors of growth and the odors of decay of the organisms found in water.

The usual cause of the disagreeable odors and tastes in potable waters is the presence of large numbers of organisms which secrete compounds of the nature of essential oils and which, though often unpleasant, are as harmless as the compounds which impart the odor and taste to fresh vegetables and fish, since they are caused by living or undecomposed organisms.

The pig-pen odor, on the other hand, is caused by the decomposition of blue green algae, which are highly nitrogenous substances containing sulphur and phosphorous. The sanitary effect of these compounds is not yet definitely known, but it seems from their composition that they would exert a deleterous effect upon health if present in considerable amount.

"Since the odor-giving principle of the living organism can be readily oxidized, producing inodorous compounds, it seems possible that the condition of many public water supplies might be improved by the use, during certain seasons of the year, when the water is infested with these organisms, of filtering material of such nature as would liberate and oxidize or absorb the oily compounds upon which the odors depend."

*"The question of chemical vs. bacteriological examination of water has of late years been extensively discussed in various papers throughout this country and England, and these discussions show a tendency on the part of physicians and of engineers in charge of water supplies, to belittle the chemist's opinion concerning the potability of a supply, and rely entirely on the findings of the bacteriologist. This feeling has been strengthened by the publication of results of trials, such as that made by the London Local Government Board. Samples of water, purposely sown with typhoid bacilli, were sent to one of the leading chemists in England and by him pronounced pure.

"Those who would attach especial value to the results of such a test, so called, and regard it as conclusive in showing the inability of chemistry to detect the presence of pollution

*Mason—Water Supply, Chemical and Sanitary.

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which bacteriology readily reveals, should bear in mind that such conditions are never met with in nature.

"The bacteriologist sought for the Eberth bacillus and found it, as a matter of course, in a sample of water specially prepared for the purpose. The chemist sought for those elements that would indicate sewage pollution, and not finding them, pronounced the water free from such contamination.

"Sewage, as it occurs in practice, contains an immense amount of matter other than that productive of disease, and it is upon the presence of this comparatively harmless but ever present material that the chemist relies in forming his opinions. A chemist could not, of course, tell whether a certain sewage-ladened water is disease-bearing at any particular time, but would condemn the water at once because of the presence of sewage matter, for though the water may be harmless to-day, it may to-morrow be the bearer of disease."

I have, at different times, had occasion to examine well-water in which the search for sewage bacteria would have been futile, yet the chemical examination, by the excessive amounts of chlorine and nitric nitrogen, revealed the presence of sewage pollution.

*"In determining a source for a proposed water supply, the service of a bacteriologist should always be secured.

"The value of chemistry, however, is more pronounced than that of bacteriology in cases where it is possible to introduce common salt or lithium chloride into the source of suspected pollution.

"Chemical analysis, by comparing the water of a stream at the point of a proposed intake with the water of the same stream at a point above all possible contamination, will tell whether the water at the point of intake suffers from the effect of up-stream pollution, and it is not necessary that the sewage be pathogenic in its character in order to be recognized. As has been pointed out by Dr. Duprè, chemistry in such cases can point out what may happen, and by timely advice prevent an outbreak of disease, while the discovery of disease germs is possible only after the water has been infected."

* Mason—Water Supply, Chemical and Sanitary.

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Bacteriology is of especial value in testing filters and in watching their efficiency; in fact it is the one method to be relied on in such cases. A simple count of the bacteria present is sufficient for this purpose, as it is reasonable to conclude that if a filter will retain harmless bacteria, it will hold back the pathogenic organisms also.

A mere determination of the number of bacteria per c. c. in a water, even if there are none of a dangerous character present, sometimes affords an indication of the condition of the water. The presence of a great number even of harmless bacteria in a water would indicate the presence of considerable organic impurity, just as an abundant growth of weeds in a field denotes a rich soil.

It was thought at one time that a distinction could be made between pathogenic forms and ordinary water bacteria by their action on nutrient gelatine.

Some bacteria possesses the power of liquifying or digesting gelatine, forming liquid peptone. It was at one time the practice of observers to report as sewage bacteria all those liquifying nutrient gelatine; but it is now known that a great number of harmless species liquify gelatine, while a number of pathogenic forms do not. Perhaps the specific form most frequently sought in water, and the one which most successfully eludes most of the attempts made to find it, is the bacillus of typhoid fever.

Dr. Leffmann, in his book on the examination of water, states that he was told by Dr. A. C. Abbott, of the University of Pennsylvania, that he has never yet been able to find the typical typhoid bacillus in Schuylkill river water; yet that water is no doubt the cause of hundreds of cases of typhoid fever in Philadelphia every year.

Vaughan, in the American Journal of Medical Science, Aug., 1892, says, concerning the typhoid bacillus: "Of one thing I am certain, and that is that I am ignorant of any crucial test upon the strength of which I can say at present that a germ which I may find in drinking water is identical with the so-called typhoid fever bacillus. I have found in spleens, after death from typhoid fever, germs which differ from the typhoid

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bacillus obtained from Berlin and from one another as markedly as my B. venenosus differs from either or both."

Prof. E. Ray Lancaster, of the Oxford University, has advanced the hypothesis that the typhoid bacillus has no independent existence outside the animal body, and that the colon bacillus, upon being introduced into the human system, becomes transformed into the conventional organism sometimes found in the spleen of a typhoid subject. Prof. Lancaster points out that the colon bacillus is of frequent occurrence in water used for domestic purposes, while the typhoid bacillus is rarely found in water.

Sanarelli seizes upon this circumstance and argues that a disease so prevalent as typhoid fever could not be produced by an organism so little known as the Eberth bacillus. He further claims to have shown that the intestinal inflammation is due to the colon bacillus.

Malvoz has held that the colon bacillus may, by suitable cultivation, be transformed into the bacillus typhosus. This is strenuously denied by other observers; and so the controversy over the cause of continuous fever may continue to the end of time.

Of one thing, however, we are certain, and that is, that polluted water is the most common carrier of typhoid infection, and that when a contaminated water supply is supplanted by a supply of pure water, a very notable decrease of typhoid fever ensues.

From this brief and disconnected survey of the subject of water supply we can lay down the following postulate:

Nature has intended that we should have an abundant supply of pure water; but the purpose of Nature in this, as in many other things, has been thwarted by the ignorance and indifference of man.

The pure water that falls from the heavens is no sooner gathered together in lakes and rivers than civilization, with its manifold organic wastes, soon renders it unfit for some of its most important uses.

In the selection of a source for a water supply, a locality as remote as possible from human habitation should be chosen. None

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of the watershed should be under cultivation, and no one should be allowed to settle on it. The storage reservoir should be thoroughly cleared of all trees, shrubbery, grass, and soil containing any considerable amount of organic matter. If these conditions cannot be met, and it becomes necessary to take a supply of water from a source liable to sewage pollution, the water should be properly filtered before going to the consumer. The watersheds, reservoirs and the entire plant should be under the constant inspection of a competent person. In all cases a public water supply should be kept under constant analytical control, that the efficiency of the measures taken to insure a pure supply may be maintained.

In the examination of water no one method can always be relied on to the exclusion of all others, for one method will often reveal what another fails to disclose. And he who in the interest of humanity is earnestly seeking to know the whole truth concerning this subject soon feels the need of every ray of light that human knowledge can shed upon his path, and will not allow his vision to be clouded by prejudice or his judgment to be perverted by hastily formed or ill founded opinions, but will readily seize upon every means that the long and earnest labors of an array of the world's best talent have placed in his hands to enable him to reach the object of his search. And in the prosecution of his purpose, he must neither slumber nor sleep, for so many and so weighty are the interests depending upon his success that, like all whose labors are in the interest of public welfare, he is soon brought to realize that here, if anywhere, "Eternal vigilance is the price of safety."

DISCUSSION.

DR. LONG.—Of diseases which can be directly traced to contaminated water, those due to animal organisms are malaria and amoebic dysentery; those due to vegetable organisms are typhoid fever, Asiatic cholera and certain diarrhœal diseases. There is danger also of infection of milk. The cause of diphtheria and typhoic fever epidemics is often proven to be due to the use of contaminated water in the families; as in wells, etc.

Methods of purification of impure water: Sand filters have

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proven to be very efficient. Mechanical filters to be efficient must be used with some coagulent, such as alum. Boiling destroys the causative germs of typhoid fever, cholera, and other diseases known to be likely to occur in polluted waters.

C. G. Currier, M. D., says: "Water may be very clear and palatable, yet at the same time may be impure. Harmful microörganisms tend to perish or become inoccuous in course of time, often entering ordinary water and yet complex conditions may make the operation of this principle uncertain. If harmful bacteria are known to be present more or less regularly in a given supply, or if the entrance of sewage or other obvious pollutions near an intake makes its presence probable, it is most necessary to employ adequate filtration or other methods of purifying water taken from that place.

The only permanent germ proof filter is the *natural* one formed by immense quantities of fine porous earth, through which the ground water flows slowly.

Filtration by well-managed large gravity filter bed of fine sand approximates this natural process, in efficiency being capable of rendering the water practically pure.

Mechanical filters can accomplish the same result, but are less likely to be maintained constantly in a condition of the highest efficiency."

Dr. Long closed by reading an editorial from the Medical News, volume 71, page 702, on the report of the British Medical Association, on Water Borne Typhoid.

DR. LEWIS H. TAYLOR.—I have discussed this question on several occasions, Mr. Chairman, in past years, and I fear that anything I may say to-night will merely be a repetition of what I have already said at other times before this society and elsewhere. I want first of all to pay my respects to Chemist Dean, who has given us such an excellent paper, and I agree heartily with him as to the importance of chemical, bacteriological, and microscopical examination of water.

I believe every city should have an experienced water inspector, but these inspections should not be monthly or semimonthly, but daily, and his salary should be commensurate with his labors and sufficient to demand the whole of his time.

And furthermore, these examinations should be conducted in a well equipped laboratory, established and maintained by municipal appropriations. I have always doubted the value of chemical examination in determining the cause of an epidemic of typhoid already established. For instance, a given spring or stream may be infected and cause typhoid. The water is

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examined and pronounced pure, which it readily may be, although impure some weeks before. Chemical or other examinations should be made at frequent intervals. All discussion of water supplies begins or ends with a discussion of typhoid fever. We all admit that typhoid fever is caused by a specific germ or by a poison developed in the presence of said germ, and we admit that water is the chief, though not the only cause of spreading the germ. Keep the germ out of our drinking water and the question is largely solved. In populous cities all wells should be condemned. Mountain streams, though often supplying a pure and wholesome water, are liable to be contaminated owing to the presence of habitations near their banks.

Typhoid germs being introduced into such streams find their way to the storage reservoirs and are multiplied indefinitely. Rivers, on account of large volume and steady flow, are less liable to continued contamination than reservoirs, but being natural drains of the country they are liable to contamination and their water should be filtered before being used.

DR. WEAVER.—The subject of filtration of drinking water is one of great importance, but there is an idea prevalent among people in general that any sort of filter will answer. This is a great mistake. Most of the domestic filters in use are only incubators of germs.

During the late encampment of soldiers at Chickamaugua some one gave an order that a certain filter should be used. Requisition after requisition was made for things really needed, without avail, but the filters were furnished against our wish. We had a beautiful camp and the sanitary arrangements were perfect, but typhoid continued. When we moved to Lexington, I said to Major McKee: If you use those old filters that we used at Chickamaugua you will spread the disease instead of checking it. They were simply typhoid incubators, and that is what most filters are.

While we admit that infected water is the chief cause of spreading typhoid, it is not the only one. At Chickamaugua I believe the chief cause was found in the numerous swarms of flies that surrounded and contaminated everything in camp.

Why, Mr. President, you never saw flies in this country; there they were everywhere, flies on everything, swarms of them, myriads of them. It was frequently stated in the papers that no officers of the Ninth Regiment were sick. This was true in the beginning. We guarded our mess tent as carefully

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as possible, and none of the officers had typhoid till near the close. It then was found that our caterer himself had typhoid and that he allowed another who had had the disease to wait on table. This was not known until it had been going on for some time. Thus on every hand there was danger, but I believe the chief source of danger was in the flies.

Orders were given to police the sinks twice a day, but you can readily see that these sinks being partly open were exposed a part of the day to myriads of flies that went from typhoid fever excreta directly to the food prepared for the soldiers. If orders had been issued and enforced that each man should police his own excreta much of the danger might have been avoided. This was done in our own regiment after a time, at my own suggestion, but it was too late. I tried for weeks to get this order issued and enforced.

Much has been said about boiling the water. You cannot educate the people to the importance of this. They do not like boiled water. In a large military camp this is a serious problem. The quartermaster did not furnish facilities for boiling the water, but if every order from the President down had been carried out to boil the water you could not have forced the men to drink it. They still would go to wells and streams for their supply.

DYSENTERY.

BY DR. B. J. WEATHERBY, WILKES-BARRE, PA.

READ OCTOBER 5, 1898.

On account of the recent epidemic of dysentery in West Pittston, Wyoming and Dorranceton, and to a less extent in our own city, I thought a discussion on dysentery would be apropos and hence have chosen it for my subject to-night.

With the laity, even among the well educated, sometimes, any severe and exhausting discharge from the bowels is called dysentery. I once took a long drive with Prof. Charlton, who has the chair of Natural Sciences, in Ottawa University, Kansas. Before starting he expressed a doubt as to whether he ought to ride out so far or not, saying he had dysentery very bad. He had a simple diarrhœa due to hot weather and change of water.

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Loomis says: "Dysentery is a specific febrile disease with a characteristic local lesion." The definition is a good one but it leaves too much uncertainty in the mind of the student, and so we look for a better. Prof. James T. Whittaker, of Cincinnatti, characterizes the complaint as "the clinical expression of a disease of the large intestine, characterized by hyperaemia, infiltration, and necrosis or ulceration of the mucous membrane, distinguished by discharges of mucus, blood, pus and tissue debris, and attended with griping and expulsive pains, tormina and tenesmus." This definition gives us a better idea of its pathology and symptoms than any other I have seen in any of the text books.

Osler says: "Dysentery is one of the four great epidemic diseases of the world. In the tropics it destroys more lives than cholera, and it has been more fatal to armies than powder and shot."

Dysentery is one of the diseases to which man has been heir from very ancient times. I am not sure but that Father Adam himself may have had some experience with it, since unripe fruit and mental anxiety are said to be among its etiological factors. Certain it is that it was known long before the Christian era, for Hippocrates, who practiced four hundred and thirty years before Christ, gave a detailed account of it, with his opinion as to cause and treatment. In the works of Hippocrates, written a few years before this, we find that it created sad havoc in the army of Xerxes while they were encamped on the plains of Thessaly. The ancients entertained some queer notions regarding its causation. Hippocrates regarded it as a descent of the humors from the brain; for instance, in one place he says: "Men of phlegmatic temperaments are liable to have dysentery, and women also, from the humidity of their bodies, the phlegm descending downwards from the brain." In another place he says: "The disease is caused by the overflow of phlegm and bile to the veins of the belly, producing ulceration and erosion of the intestine." Celsus, who practiced twenty-five to forty-five years A. D., added nothing new to what was already known. Aretaeus, a few years later, considered all bloody discharges from the rectum

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dysentery. Galen, about 164 A. D., saw the mistake of Aretaeus, and taught that there were four distinct varieties of bloody stools, only one of which was dysenteric. He thought the disease was essentially a congestion and ulceration of the large intestine, and treated it with drying earths, much as we treat it with bismuth, chalk, &c. He recommended the use of dried dung of dogs that had been fed on bones, given in milk curdled by dropping hot stones into it. This practice proves that homœopathy is an ancient institution, as this treatment was clearly based on the theory of "*similia similibus curantur*." During the middle ages, or from about 700 A. D. to 1600 A. D., came a period when scientific researches in medicine ebbed very low, and this subject, like so many others, was nearly forgotten. About 1672 Sydenham, of London, made some original investigations, and published a very full and complete article on the pathology and treatment of the disease. Few superior articles have since been written on the subject. He taught the use of laxatives and rectal injections, followed by large doses of opium, keeping the patient quiet in bed, and restricting the diet to milk and animal broths. Since then, the more perfect methods of physiological and pathological research, with the more ample clinical facilities, have enabled others to push the work, until to-day dysentery is thoroughly understood, and the treatment is comparatively successful.

Dysentery may be acute or chronic, epidemic, endemic or sporadic. The Hindoos, three hundred years ago, recognized the first two varieties, which they subdivided into six others; these they ascribed to air, bile, phlegm, food, emotions and passions. Practically to-day we divide the affection into two general classes, acute and chronic; and either class may be epidemic, endemic or sporadic. Generally, during an epidemic, we find both varieties, the chronic being a sequel of the acute, although some cases may be chronic from the first. Dysentery is not confined to any climate or latitude, although it is relatively more frequent near the tropics. No country seems to be totally exempt from it in some form; but epidemics are more frequent and severe in hot countries, while sporadic cases occur frequently in the more temperate climes. The immortal

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Shakespeare refers to the "griping of the guts" among the "rotten diseases of the South." In India there are more deaths every year from dysentery than from all other diseases put together. It is especially dreaded in the English army stationed there, they being more subject to it than the natives, although many of the latter fall victims to this dreaded disease. Egypt is not far behind India, while in a large part of Africa, the Pacific Islands, and in portions of South America the disease is very frequent and fatal. The reason why tropical countries are worse is probably the higher temperature, the habits of the people, the kind of food in use there, the luxuriant vegetation, &c. It is not limited to any season of the year in our country, although epidemics are comparatively rare except in summer and fall. Seasons of high temperature may cause epidemics in localities where it has only been endemic or sporadic. The summer just passed has been one of unusually high temperature, which may account for the severity of the epidemic during the past weeks, experienced especially by our neighbors west of the river. Protracted heat lowers the resisting powers of the individual and makes him more susceptible to disease of any kind. It also favors germ growth of all kinds and, unless extra precautions are taken, renders dangerous many of the foods, such as milk, meats, ripe fruits, &c., through the development and growth of pathogenic germs or their ptomains. Heat alone, however, will not produce it. It occurs in Egypt at the time of the overflow of the Nile, and in parts of Asia, Africa, and other countries where the rains are periodical, it begins and ends as an epidemic with the beginning and ending of the rainy season. Osler says that sudden changes in temperature are more harmful than variations in moisture. "Catching cold," suddenly checking perspiration, exposure to the hot rays of the sun by day, and bivouacing in the open air at night, as in armies, seem to favor its development. It has long been observed that army and prison life is almost always attended with dysentery in some degree. Undoubtedly many causes, among which are overcrowding and unsuitable food, as well as bad water, are mingled together as etiological factors when it occurs in

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army life. Bad water certainly takes an important place in its causation, as has been proven by the immediate subsidence of epidemics on record after the water supply has been investigated and corrected. The character of the intestinal contents may cause it. Peristalsis in the colon is slow even in health, and if irritating food, or that which leaves a large residue in the bowels, is taken in considerable quantities, it may act mechanically, and by prolonged and irritating contact may cause hyperaemia, which, if the system is debilitated even temporarily, from any cause, and unable to throw off the pathological process, may result in ulceration and all the characteristic phenomena of dysentery.

The class of food used in the tropics contains a large amount of residual matter, which may account in a measure for the greater prevalence of the disease in those regions, and our own diet during the summer is largely of the same character. The German authorities give constipation a very important place in the list causes.

Feces, after they have been voided, are thought by many to generate a specific germ which may cause the disease. People in the tropics are not very particular in their habits, throwing their dejecta anywhere, sometimes through a hole in the floor of their hut. This leads to a consideration of the contagiousness of dysentery. If it is true that there is a specific germ which, if ingested, will cause dysentery (and to-day few, if any progressive physicians doubt it) then the disease is contagious in the same way that typhoid fever is contagious. It is said that these germs are very tenacious to life, as is proven by the instance of some men taking the disease after cleaning out a privy into which the dejecta of a dysenteric patient had been thrown ten years before. The amoeba coli, as it is called by some, or the amoeba disenteriae, as it is called by others, is now proven to be the specific germ which causes the disease under consideration. This germ is constantly present not only in the evacuations of all dysenteric patients, and in the intestines, but it is also present in the pus of hepatic abscesses which so often complicate or follow dysentery.

Hart and Smith, of London, in Twentieth Century Practice,

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say regarding its contagiousness: "Dysentery is not directly contagious from person to person. Nevertheless, it is a definitely infective disease, the infection lying in the discharges, and gaining access to man by reason of the soil or drinking water becoming polluted. It may thus be looked upon as analogous in its mode of distribution to cholera and typhoid fever." We can thus imagine how the various foodstuffs already alluded to as causative may become so, not in themselves primarily, but by acting as hosts for the specific germs or by their irritant action. We can also see how constipation, by retarding elimination of germs which have gained access to the alimentary canal, may also be indirectly a cause.

As Loomis taught, dysentery is primarily a local disease with constitutional manifestations. The characteristic changes are found to be an inflammatory or ulcerative process in the large intestine. In sporadic or very mild cases, there is simply a catarrhal inflammation, usually confined to the rectum, sigmoid flexure, and perhaps the descending colon. In the different classes of dysentery the inflammation does not differ in kind, but only in degree. As in other inflammations of mucous membranes, so in dysentery we have catarrhal, diphtheretic, and ulcerative inflammation, each being of a higher degree of intensity than the one before it. In epidemic dysentery we generally have the diphtheretic, which usually terminates in the ulcerative. When a patient is attacked there is first a hyperaemia of the glands of the colon. As the disease progresses there is poured out into the mucous and submucous tissues lymph, containing leucocytes, blood globules, &c., which is spoken of as an exudation. Should the disease go on, necrosis of this exudate takes place and ulcers are formed. Generally the process is confined to the colon, though cases are on record in which the disease has reached even to the stomach. All parts of the mucous membrane may not be affected alike, the parts near the folds being a favorite seat of the disease. The ulcers are usually regular in outline, and are generally round or oval. Their base may be upon the submucous tissue, or in the muscular coats of the bowel, while not rarely perforation takes place, resulting in peritonitis, or fecal abscess.

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Associated with these lesions are often found changes in the liver, spleen, kidneys, joints, &c. The most common complication is abscess of the liver, which occurs so often that it is sometimes looked upon as an essential part of the disease, while in former times some authors considered this the primary lesion, all the other symptoms being secondary. Multiple abscesses of the liver are more generally found in the tropics than in temperate climes. The symptoms are usually well marked and the diagnosis not difficult. The milder cases are usually preceded by anorexia, furred tongue, a vague feeling of general discomfort and some fever. There is often constipation, or constipation alternating with diarrhœa, and symptoms of gastro-intestinal catarrh. After a variable length of time, the patient experiences colicky pains, referable to the region of the colon, or extending over the entire abdomen. The pains are usually intermittent or remittent, and are of a peculiar boring or twisting character. During the time there is more or less desire to go to the stool. Unlike the pains of diarrhœa, they persist after a passage from the bowels, causing the patient to spend much of his time straining over a chamber or bedpan. There is a feeling of a foreign body in the rectum, accompanied by intense burning pain in that region. The tenesmus is so great as to cause prolapsus ani in some cases. The usual number of stools in twenty-four hours is from fifteen to thirty, although there is practically no limit, some patients having as many as two hundred. If pressure is made over the colon at this time, it will be found to be very tender, and later in the disease, its thickened coats can be felt through the abdominal walls. The character of the stools varies with the stage of the disease. At first the voided matter consists of the contents of the intestines, mixed with bile, &c., then a glairy mucus resembling the white of egg which may be mixed with blood, and, later on pus, tissue, debris, &c. The amount of each evacuation is usually very small, but owing to their frequency they soon cause an astonishing degree of emaciation for the time the patient has been sick.

During an epidemic, or when we have the diphtheritic form, the onset may be sudden—in some cases so sudden as to cause

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suspicion of poisoning. The typhoid state may be present from the very first stool. Large shreds and patches of membrane, consisting of pus cells, dried mucus, blood, tissue debris, &c., are found in the stool. These pieces may sometimes be casts of portions of the colon, and led to the belief, among the older authors, in its being an exfoliation of the mucous membrane of the bowel. Sometimes the stools contain pure blood, which may be present in large quantities. This is generally due to an ulcer extending to some of the capillaries, although hemorrhage may take place when there is no solution of continuity. The same may be said of pus, as has been frequently demonstrated by autopsies.

As the disease progresses the patient becomes weaker, the pulse frequent and thready, and the thirst intense; there is complete anorexia; the temperature reaches 104 or 105 F., with delirium, especially at night; great restlessness and insomnia; a dry, brown cracked tongue; and finally all the phenomena of the status typhosus. In addition to the exhausting effects of the local conditions in the bowel, the system has now become poisoned by the absorption of ptomaines and toxines produced by the amoeba coli.

The duration of a mild case is usually from eight to twelve days, if there are no complications; the severer types of the disease may continue for weeks. The prognosis may be very good, or very bad. In acute uncomplicated cases that are not epidemic, or in cases arising from malarial influences, &c., the prognosis is good. In epidemics of a severer type, or those due to bad hygiene, filth, over-crowding as in armies, prisons, etc., the prognosis is bad.

Treatment is divided into prophylactic and curative. Since we now know the direct cause to be the amoebia coli, and class dysentery with cholera, typhoid and yellow fever among the water borne diseases, the necessity of prophylaxis cannot be over-estimated. The same rules that would apply to the prevention of typhoid or yellow fever, or to the stamping out of an epidemic after it has once started, apply to dysentery. First of all the water supply should be investigated and corrected. Where we are not absolutely sure of getting pure

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water, all water had better be boiled. Remember, that boiled water easily becomes reinfected; so especial pains should be taken to prevent this. Not only the drinking water must be rendered pure, but also the water used for household purposes, washing milk cans, etc., just as in the other water borne diseases. The following paragraph is quoted from Hart and Smith, of London: "In the preventive treatment of dysentery as indeed of cholera and other diseases of the same type, it is important not to confine the attention solely to the means of securing from infection that prime commodity—water."

"The predisposing causes of the disease must be considered besides the actual infection by which it is set up, and among these must be noted all causes of indigestion, and of what would in ordinary times and seasons be spoken of as diarrhœa: the eating of unripe or overripe fruit; the drinking of spirits, especially in view of the fact that this practice usually involves also the drinking of more or less impure water; excessive exertion, and exposure to chills. All these have the effect of inducing a condition of the intestines which, without having any direct connection with the infection, leaves them open to its attack. If one would prevent the disease such predisposing causes must be most carefully guarded against. The direct cause of the malady, however, is infection by a living germ, which is somehow or other carried from a preceding case, and this germ, although gaining access in various ways, is no doubt usually carried by water."

Where one is surrounded by malarial influences, a prophylactic dose of two or three grains of quinine at bedtime every second or third night may prevent an attack. The bowels should be kept clear of irritating matter by an occasional dose of sulphate of magnesia or a Seidlitz powder. The stools of a previous case should be mixed with some inflammable material when practicable, and then burned. Where this is not possible a strong antiseptic solution should be kept constantly standing in the chamber, and all dejecta should be received into this. After the vessel has been used it should be scalded with boiling water and some of the antiseptic solution again poured into it. All soiled clothes should be at once removed

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and either placed in an antiseptic solution or boiled; prolonged boiling being preferred.

The first thing a patient needs after he has taken the disease, is to be put to bed in a well ventilated room, since complete rest is an important factor in successful treatment. As Snydenham said in the seventeenth century, the diet should be restricted mainly to milk and broths. The milk is generally best boiled, or, if necessary, peptonized. Some of the artificial foods, such as Horlick's malted milk or Eskay's albumenized food, do well. Next important to rest and restricted food is high rectal injections. The extreme irritability of the rectum and the tenesmus is a great drawback in this line of treatment, especially with children; but wherever possible it should be employed. Osler advises the preliminary introduction of a small cocaine suppository, or the injection of a small quantity of a four per cent. solution, after which the tube may be introduced. The manner of giving the injection is important. The patient should lie on his back with his hips elevated so as to get the assistance of gravitation. The injections must be as large as can be borne—from two to six pints, so that every part of the large intestine is reached. The water should be at a temperature of about 100 and should enter the bowel slowly. There is some danger in these injections, especially in the later stages, when there is danger of perforation, hence they should be given carefully.

Many and various medicaments have been used in these injections—alum, sulphate of copper, acetate of lead, creolin, resorcine, quinine, etc. Osler advises silver nitrate in the subacute stages, twenty to thirty grains to the pint, using three to six pints of the solution. This plan is recommended by Hare, of Edinburg, Stephen McKenzie, and H. C. Wood. The treatment is at times intensely painful. For myself, I prefer creolin, in the strength of one dram to the pint. Since the disease is the result of a certain known germ, and its field of operation is in the colon, colon flushings with antiseptic solutions is the most rational treatment. We may also supplement the flushings with the so-called intestinal antiseptics given per orem, but most of them are of doubtful utility. Theoretically

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salol, thymol, creosote, beta naphthol, etc., are all beneficial. Practically, their effect in antisepticising the colon is doubtful, or at best very weak. Antiseptics taken by the mouth are either entirely absorbed or very much attenuated before they reach the large intestine. I believe they are of considerable value, however, not in destroying the amoeba coli but in preventing fermentation and putrefaction in the intestinal contents, and in rendering the soil less fertile for the further growth and development of the germ. Personally I prefer salol and beta naphthol. Bismuth, given in large doses, generally gives good results; but the dose must be large—much larger than is usually given—from twenty to thirty grains at least, from two to four hours apart. A new bismuth and iodine compound, called endoxine, is said to be especially effective by those who have used it, while it has the advantage of being non-poisonous in ordinary doses. Opium in some form is absolutely necessary to control the tormina and tenesmus and give the patient rest. It must be given for effect, regardless of dosage. During the latter stages strychnia and alcohol will be needed. The use of the normal salt solution in pint to quart doses by the hypodermoclysis method or per rectum, may also tide the patient over a critical period and so save life. I have had no success with the ipecacuanhea treatment.

These are only a few of the remedies that may be used; but they indicate the line of treatment, and I will not consume time in giving a more extended list. As I finish this paper I read in a recent journal that a Ceylon physician claims to cure dysentery speedily with dram doses of ammonium chloride given every four hours with a milk diet.

DISCUSSION.

DR. ROE.—During the early years of my practice I witnessed a number of severe epidemics of dysentery. Saw twenty-five or thirty cases during each epidemic, and the mortality was from twenty to twenty-five per cent. As regards treatment, I found large doses of ipecac very effectual.

Hypodermic injections of morphia relieve the tenesmus. Rectal injections of pounded ice suspended in water give great

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relief. I have seen a number of cases lately in the soldiers returned from southern camps. High rectal injections of a solution of tannin, followed by a small injection of starch water and laudunum, to be retained, has proven entirely satisfactory.

DR. JONES.—Epidemics of acute dysentery are not really as frequent in occurrence in the valley as they were twenty years ago, neither are they so malignant nor fatal. I feel that I cannot speak in too strong terms against the use of opium in any form during the acute stage of dysentery. It never checks the tormina and tenesmus, indeed I think it rather increases their severity. I am very much in favor of initiating the treatment with large doses of calomel, ten or twelve grains, followed in four hours by half an ounce of sulphate of magnesia, and following this again, say, with ℈ doses every three or four hours.

I have found that belladonna or its alkaloid has a soothing and modifying influence upon the tormina and tenesmus.

DR. KNAPP.—I heartily coincide with Dr. Jones in not giving opium in dysentery. My plan of treatment is for free and frequent irrigation with sulphate of magnesia, free flushings of the colon with normal salt solution, disinfection of the bowels with bismuth subnitrate in at least twenty grain doses, and stimulation of the intestinal cells with small doses of castor oil and dilute turpentine.

DR. WEATHERBY, in closing the discussion: We seem to be practically agreed on the treatment. As to giving opium, I would not give it in the beginning unless the case were unusually severe from the start. I always clean out the bowels thoroughly before using opium. Formerly I used Dover's powder, but during the past five years I have used codeia, not only in dysentery, but also in most cases where I used to give morphia. It must be given in larger doses than morphia. I prefer the saline cathartics, as they produce large, watery stools, which carry out not only the retained feces, but the pathogenic germs as well; besides the salines have a soothing effect on the inflamed mucous membrane of the bowel.

I believe Dr. Knapp's idea of administering a few whifs of chlorofom before giving the enema is a good one, especially with children. I have been called in consultation where the patient was a child, where the attending physician was obliged to discontinue this very essential part of the treatment on account of the resistance of the patient.

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I do not believe the medication of the water used in making the injections is of as much importance as the way it is given. As I said in the paper, I use creolin, one dram to the pint. I would not like to use nitrate of silver in the strength recommended by Dr. Osler. I believe the normal salt solution as good as any.

PREVENTION OF DIPHTHERIA.

BY DR. J. I. ROE, WILKES-BARRE, PA.

READ NOVEMBER 2, 1898.

The *cure* of disease is always an important subject with every physician. If the proverbal ratio of ounce to pound holds good, then the *prevention* of disease is sixteen fold *more* important.

That we have a *cure* for diphtheria in the antitoxin treatment, I believe is now a well established fact. What we can do to *prevent* this dreaded disease will be the subject of a few practical commonplace suggestions embodied in this brief paper.

Let us suppose that Dr. Blank, a general practitioner, is summoned to visit a child who is suspected to have diphtheria. The doctor has children of his own, and he is also mindful of the possibility that he might carry contagion to other children whom he may be attending; he is therefore provided with a supply of linen dusters, one of which he puts in his carriage and proceeds to visit his patient. Before entering the sick room he removes his coat and cuffs and puts on the duster, buttoning it carefully high around his neck. Having examined his patient and satisfied himself that the case is one of true diphtheria, he proceeds to treat it accordingly, not losing sight of the fact that several other children in the family have been or may be exposed to the disease.

Passing by the treatment of the patient, let us observe what precautions are taken to prevent the spread of the disease. The room now occupied is on the second floor, adjoining or communicating with the sleeping rooms of other members of the family. The doctor believes in as thorough isolation as

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possible, and finds upon inquiry that a large, well ventilated room on the third floor is available. He directs that this room be prepared for the patient. The carpets, all upholstered furniture, pictures, books, hangings, in fact everything not required for the use of the patient or attendants is removed; the room is thoroughly cleaned and dusted, and is then ready for occupancy.

The room from which the patient is removed is to be fumigated; all bed-clothing, &c., thoroughly boiled, and every precaution taken to remove any possible source of danger to the future occupants. The patient having been removed to his new quarters, explicit instructions are given to the nurse or attendant as to the precautions to be observed in his care.

In the first place two bowls should be provided, one containing a one to twenty solution of carbolic acid, in which all spoons, atomizers, dishes, &c., used by the patient should be immersed immediately after being used. The second bowl should contain a one to forty carbolic solution, which should be used by nurse and physician as may be needed after handling or examining the patient.

All discharges from the nose or mouth should be received on small pieces of old muslin or gauze and immediately burned; small paper bags may be used as temporary receptacles for all articles of this kind, provided there is no means of burning them in the room. All supplies brought for the room should be left outside the door, and no one should be allowed to enter the room except the necessary attendants.

In refilling prescriptions, copies of the numbers only should be sent to the druggist, and all containers should be destroyed. Care should be exercised to prevent domestic animals of every sort from entering the room.

The nurse is directed to wipe the floor and all places where dust is likely to settle, with a cloth dampened in a 1–1000 bichloride solution, once or twice a day. She is also cautioned not to eat or sleep in the room, to bathe her hands and face in the carbolic solution and change her clothing every time she leaves the room. She is also advised to take two or three hours in the fresh air daily, if possible to do so.

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Having thus surrounded the patient with every possible safeguard to prevent the spread of the disease, the doctor now turns his attention to the other members of the family who may have been exposed to the contagion. He believes that experience has proven beyond a doubt that antitoxin not only *cures* but that it also has the power to *prevent* diphtheria. He has read the report of the New York health department, covering nearly 16,000 injections in exposed persons for the purpose of immunization, and that only one in two hundred thus immunized developed the disease within thirty days. What stronger proof could he ask? He, himself, has used it many times before, and he fully believes it is his duty to do so in every case. He, therefore, orders a bottle of antitoxin containing a sufficient number of units to immunize the children who have been exposed, and an extra 500, which he advises should be given to the nurse as she is most exposed and most likely to contract the disease. The nurse is also advised to use an antiseptic gargle several times a day. She should be very careful in spraying the child's throat to avoid any expectoration which might be coughed in her face. Should unusual danger from this accident be present, a pane of window glass should be held in front of the child's face whenever it is being sprayed. Having first taken these precautions with the nurse, the doctor proceeds to immunize the exposed children, giving from 100 to 400 units to each child according to age. A very convenient plan is to draw the required quantity of serum into the antitoxin syringe, and by means of the screw on the piston regulate the dose for each child. By using the concentrated serum now manufactured, it is seldom necessary to inject more than ten minims. If preferred, an ordinary hypodermic syringe may be used for this purpose.

Having taken all these precautions, the doctor can rest assured, if his instructions are carried out, that there will be no spread of diphtheria from his case.

Still, his work is not finished, for when his patient has recovered, the room which he has occupied needs to be most thoroughly cleansed and fumigated. Walls, ceiling and all wood-work should be washed with a 1–1000 bichloride solution.

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Every city, through its board of health, should have a steam disinfecting plant, where bedding, blankets, carpets, &c., should be sent and thoroughly sterilized. In the absence of such a plant a competent man should be employed who should be furnished with a fumigating outfit for the use of formaldehyde. It should be his duty after every case of diphtheria or scarlet fever to fumigate the house thoroughly.

In this connection I would say there are at least two other things with which every progressive, up-to-date first-class or third-class city should have.

And these are: *First.* A bacteriological laboratory, "where the diagnosis of all doubtful cases may be settled by means of cultures, in order that proper and necessary means of prophylaxis may be taken in every case of true diphtheria, even though it is mild, and also that unnecessary expense and trouble be not imposed in cases of false diphtheria." This could also be very advantageously used for examinations of throat secretions during convalesence, and I understand in some places ordinances have been passed requiring such examination before children who have had diphtheria are permitted to return to school.

Second. I believe there should be some provision in every city for institutional treatment of diphtheria, not only for the poor, but with private rooms for cases developing in hotels boarding houses or any place where isolation is impossible.

I firmly believe, if it were possible to fully carry out all the foregoing suggestions, this much dreaded disease would soon disappear from the face of the earth.

DISCUSSION.

DR. LONG.—It is about three years since such precautions were first suggested to this society. It is very easy to have sterilized dusters ready to take with you to cases of contagious disease. I always have such ready to take with me, then leave it at the house and use it all through the course of the case. These rules can be carried out except in the very poorest families; in such cases of contagious disease the hospital would be of utmost value.

DR. GIBSON.—Many cases of sore throat, which are regarded

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as harmless, are the means of spreading diphtheria; such should not be allowed to attend school.

DR. FAULDS.—I have never changed my coat in going to a case of diphtheria, and so far as I know, I have never carried the disease to another patient. It is just as necessary to disinfect hair and beard as to wear a linen duster. It is impossible to stamp out the disease thoroughly. Suddenly a child is taken ill with diphtheria without coming in contact with known cases, but this may be taken from domestic animals. There are too many germs in existence already, outside the sick room, to make it easy to get rid of this disease, even with the strictest precautions.

DR. WETHERBY.—If the precautions mentioned by Dr. Roe were taken, the disease might be eradicated, because these are unusual and thorough precautions. Oftentimes we cannot trace the disease; sometimes it comes in strange ways. I had a case of scarlet fever out on the prairies, the origin of which was very obscure. I afterward found that letters had come from friends east, from a family in which there were several cases of scarlet fever; newspapers from the same family which had been lying around the sick room, had been forwarded to the west and were no doubt the carriers of contagion. If carefully studied the origin of the contagion can usually be found. I was surprised in reading in a New York paper recently a letter from Dr. Welsh of Philadelphia, who stated that he did not believe in antitoxin. He had a large number of cases in which the serum had been used and in which he could not see any lessening of the death rate. I was called sometime since by a physician who did not believe in antitoxin to see a child with membranous croup; he said the child would die, as he never saw such a case get well. I suggested antitoxin; the next day the child was no worse and a second dose was used and the patient recovered.

DR. HOWELL.—I would like to report a case of the spread of diphtheria by the carelessness of the attending physician, or rather the mistake arising from improper diagnosis. In a family with five children, one child was ill with sore throat, thought to be tonsilitis. It was slow in getting well and the doctor regretted that he had not used antitoxin, but the child recovered. Later, two children in the same family came down with diphtheria, and later two more. Antitoxin was used and they recovered; but this shows the necessity of careful diagnosis and careful precautions against the spread of the disease.

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DR. ROE.—In closing I wish to emphasize the importance of prevention, especially in making a careful diagnosis and in destroying all sputa. The physician should of course wash his hair and beard before leaving the home of a diphtheria case. In regard to the immunity afforded by antitoxin, I am sorry to say my own experience has not been as favorable as I could wish. In one case the greatest care was taken to prevent the spread to another child in the same family, the child being taken away from the house, but upon return to the home after the first child had fully recovered, the child returning was taken down with diphtheria four days after its return. In another family the same result occured after the utmost care. In both of these cases an immunizing dose of antitoxin had been used.

THE USE OF CHLOROFORM IN LABOR.

DR. J. T. HOWELL, WILKES-BARRE, PA.,
READ DECEMBER 7, 1898.

In the practice of obstetrics no one would consider his armamentarium complete without a bottle of chloroform. Yet we can hardly realize that it is only fifty years ago when it was first used to mitigate the pains of labor, and in fact preventing all pain formerly endured by patients who were obliged to submit to operations, which in all ages and among all people had challenged sympathy and had been recognized as one of the most striking features of humanity.

To Simpson, of Edinburg, belongs the honor of having first induced unconsciousness by ether for the purpose of facilitating the pains of labor. In the latter part of the same year, 1847, when Simpson and his friends Keith and Duncan were experimenting with chloroform, that had been looked upon as a chemical curiosity, they found an anesthetic superior to ether, especially for obstetrical purposes. The quantity of the agent required was small, its action was more rapid, its odor more pleasant and the effect less irritating upon the air passages. Even at that time chloroform rapidly displaced ether, and almost entirely superseded it.

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The first administration of an anesthetic in this country for obstetrical purposes took place in the city of New York as early as February, 1848.

The use of anesthesia in labor became so universal that it soon raised a storm of hostility and a controversy awakened that had few equals in the annals of medicine, not only in this country but in Europe. Leishman says, in his volume of 1879: "We look back to this period, 1848, and turn over the pages of the pamplets which mark the bitterness of the controversy, which was then being waged, with a feeling partly of amusement and partly of humiliation."

In April, 1853, chloroform was administered to Queen Victoria at the birth of her seventh child. She expressed herself as greatly pleased with the result, an event which exerted a greater influence upon the progress of obstetrical anesthesia in Great Britian than all the efforts of scientific men. In all time to come, for this service, homage is due to her as to the woman rather than as a Queen.

At the present day chloroform is the accepted anesthetic in labor and is preferred in all cases. There are some medical men who prefer ether, either through fear of the use of chloroform or from some unpleasant experience in its administration.

In the past seventeen years I can recall but two cases in which the use of chloroform would have been fatal had it been used at all or used to its full anesthetic effect. The first case occurred 1892:

Mrs. W.—Multipara—A very large woman, with a waxy complexion, having a soft weak pulse. This woman was having a very hard labor, necessitating the use of forceps, but my better judgment forbade me to use chloroform. Two weeks later I was summoned to see this woman, but on my arrival she was dead. No doubt the cause of death was due to a fatty heart.

The second case occurred in 1897:

Mrs. M.—Her second confinement. This woman being of a very nervous temperament could not bear very much pain. The labor was very tedious, and even after full dilatation the head did not make any advancement, but seemed to stick in the pelvic bones. Chloroform was administered, the forceps applied and the child's head freed from the obstruction, at the

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same time the chloroform was withdrawn, the woman being allowed to have a natural delivery, which occupied at least thirty minutes. By that time she had fully recovered from the effects of the anesthetic. After the birth of the child she suddenly collapsed, her countenance becoming blue, pulse-beat hardly perceptible, necessitating the hypodermic use of strychnia, nitroglycerine, digitalis and other heart stimulants. After working with this woman for several hours she was left in safety. I fully believe had this woman been left under the influence of chloroform during her entire labor she would have succumbed.

When the severity of the pains demand it we should not hesitate to give chloroform. There are many conditions which prevent danger from its administration. The recumbent position is an element of safety.

The suffering woman accepts relief more than willingly. She has no dread or gives a thought to the supposed danger from its effects, and if she demands it she should not be denied its beneficial influence.

I recall a case in which the patient, a Mrs. McD.—Primipara—had been in labor for forty-eight hours, pains very severe, so much so that she had fainting spells, lasting from three to five minutes. The os being fully dilated, I gave chloroform, applied the forceps and had a safe delivery.

The rapidity of the action of chloroform is an important factor; entering the system through the pulmonary circulation it passes directly with the blood current to the nervous system; in like manner and with the same rapidity the system clears itself, and cessation of administration ensures speedy cessation of effect. The small quantity required, its pleasant odor, its managability are all elements which recommended its use in labor. An ounce of chloroform is a great plenty, but it must be properly administered to obtain the best results. The pouring of a quantity of chloroform on a napkin or handkerchief and holding it over the patient's face is very faulty.

There is no better inhaler than the common tumbler, which can be found in every household. The receptacle is partly filled with a napkin and about a drachm of chloroform poured on it; it is then held over the patient's nose and mouth, not too

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closely, care being taken to allow plenty of air, which is the best dilutent for chloroform. We all know how gratifying it is, not only to the obstetrician, but to the patient, while attending a case of labor to find everything in a normal condition. The average woman will not complain of true labor pains, but there is an under current that causes intense suffering, which the woman describes as not being the right kind, that demands of us to give relief. Take for instance in many cases of occipito posterior position or other abnormal presentations, when it is almost a physical impossibility for the woman to deliver herself. Are we to stand by idle and see our patient suffer when she can be relieved by the use of chloroform and the forceps? In natural labor the woman does not ask for help and often will decline it if offered.

That experience is a great teacher, can be truly said in the practice of obstetrics. We no doubt in the early years of our practice are too prone to use chloroform to facilitate labor.

The question often arises: what are we to do in the long, tedious and painful labors, occurring generally in primipara. Often you can alleviate the pains with a hypodermatic injection of morphia, chloral by rectal injection or by a warm vaginal douche; but there are cases which do not yield to any kind of treatment. Long continued pain is a powerful depressant; when combined with starvation and want of sleep greatly impairs a woman's capacity to resist some of the perils that might follow her convalescent period. The often repeated doses of morphia and the long continued use of chloroform no doubt have a deleterious effect on the child; it is either still born or when born deeply cyanosed.

In primipara, having true labor pains, it is always well to allow twenty-four to thirty-six or even forty-eight hours to complete labor. When the membranes have not ruptured, the cervix is dilating slow, but surely, and after full dilatation has taken place you can rupture the membranes, hasten delivery by giving chlorolorm, and applying the forceps.

Where the membranes have ruptured before dilatation, the descending head being a hard substance which is made to serve as the dilating body, the pains are often unbearable. In these

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cases much can be accomplished by giving chloroform, using the hand as a dilator; after having accomplished sufficient dilatation the forceps can be applied to hasten delivery.

We all know and realize how important it is to preserve the perineum of woman during parturition. On our first examination we generally take a mental cognizance of its elasticity, although the resistance varies in different individuals, and it is often difficult to foresee what will happen. Yet without chloroform the muscles of some perinei do not relax, and there is nothing more efficient as a preventive of rupture than the administration of an anesthetic.

We cannot expect a woman suffering all the pangs of parturition to be a passive being. The use of chloroform prevents those sudden movements of the body made by the woman in the agony of her sufferings by which rupture is often caused. Even should we have every reason to believe that the perineum will relax sufficiently to allow the passage of a solid body without rupture, we know how chagrined we often are to find rupture has taken place.

Chloroform does not abolish uterine contraction. Should labor proceed until the head reaches the perineum, and there is a doubt about its dilating sufficiently for the passage of the head, it has been my practice to give chloroform and use the short forceps, not to hasten delivery, but to retard the expulsion of the head, making traction in the interval, resisting the pressure of the uterine action; by this method time is gained for the tissues to give and you can invariably save the perineum.

The administration should immediately cease after the delivery of the head. The third stage of labor does not demand it, and by the time the woman recovers from the effect of the anesthetic the placenta can be delivered, and she can be made comfortable. On awakening, the obstetrician will have earned the heartfelt gratitude of his patient for having saved her so much suffering.

Authorities consulted:

Hirst—"American System of Obstetrics."
Lusk—" Midwifery."

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DISCUSSION.

DR. FAULDS.—I agree with the essayist that anesthesia in labor has its advantages and disadvantages. In an obstetrical practrice numbering over two thousand deliveries, I have not resorted to anesthesia in perhaps more than five per cent. of my cases, and seldom for the relief of pain. Nearly always for relaxation of the uterus or perineum, as in turning or forceps delivery. For the relief of rigid os, I much prefer morphia and atropia. During the second stage of labor when the pains are unusually severe and the patient very nervous, obstetrical anesthesia is a great boon, but is often produced at the risk of weakening the pains, retarding labor and making forceps delivery necessary, when without anesthesia, labor would have terminated naturally. As a rule women bear the expulsive pains of parturition, except just as the head is emerging, without serious suffering, and to subject them to the risk of anesthesia, except in well selected cases, seems hardly justifiable. True, obstetrical anesthesia, as a rule, is not attended with danger, but the number of cases in which alarming hemorrhage may follow its use, or the few cases of fatty heart or nephritis in which even a small amount of ether or chlorofom, administered for an hour or more, might give rise to grave symptoms, should make us cautious in its use.

DR. ROE.—I believe there are few cases of labor in which the use of chloroform is not an act of mercy to the suffering patient. It is my practice to use it in nearly all cases. It is seldom wise to give it until the second stage is well advanced, although there are some cases of very nervous women to whom small inhalations, even during the first stage, may be administered to advantage. It will allay the nervousness which sometimes inhibits the contractions, and under its anelgesic influence the pains become more effectual. It is best not to push the chloroform to the point of complete anesthesia, but just sufficiently to deaden the sharpness of the pain. In fact one ought always to be able to carry on a conversation with the patient. At the very last, however, it may be pushed somewhat more, so that during the last two or three pains there is almost complete anesthesia. I generally use a small napkin in an ordinary tumbler, pouring on about a half drachm, which will usually be enough for about two pains. I seldom find it necessary to use more than a half ounce for an ordinary case. The Esmarch's mask, or a towel held over the face, using the drop method, is probably preferable, but is not so convenient as the glass.

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While I have never used the Schleich's mixture, I believe it would be an ideal anesthetic in labor, especially if it is necessary to repair the perineum, as it is in quite a large number of cases. It is here necessary to produce more profound anesthesia than during the labor, and I believe either the Schleich's mixture or ether are safer than chlorofom. During the first stage of labor chloral in fifteen grain doses every twenty minutes, for three or four doses, gives great relief and does not retard labor as does chloroform.

DR. GUTHRIE.—The more I practice medicine the more I use chloroform in labor—now in a far larger percentage of my cases than formerly. A word as to chloral: I have come to fear it, not so much for its effects on the mother as on the child. In two cases there was much trouble in resuscitating the children. We do not know that the infant is affected by what the mother takes during labor. We have noticed, in giving morphia, the infant will sleep many hours after birth. In one case referred to, after the birth, the child gave a gasp or two and fell over limp and seemingly dead. After long effort with artificial respiration life was restored.

In the second case twenty-five grains of chloral had been used, and all efforts were unavailing to restore the child. I have gone back to my early teachings.

In the first stage, morphia. In the second stage there is a natural congestion of the brain due to expulsive efforts of delivery. I use the tumbler and napkin, place the patient in proper position and give chloroform to partial insensibility, and believe it greatly facilitates labor. I do not fear chloroform in the second stage of labor. In some cases full insensibility is necessary. One point to be considered: there is sometimes a relaxed condition and post partum hemorrhage liable. Hence it is necessary to give ergot.

DR. J. B. MAHON.—We all vary greatly in our beliefs in the use of drugs.

I have a horse which I believed up to eight months ago would go anywhere. About that time he went across a rickety bridge and became frightened; now I find it difficult to get him across a bridge. I heard Dr. Guthrie say, a month ago, he had given ether hundreds of times without danger; I thought so too, but sometime ago I saw a patient nearly succumb under ether, and since then I have feared the use of it.

I believe post partum hemmorrhage is more apt to follow the use of chloroform. I am not inclined to boast of success in practice, but I have attended many hundreds of cases and

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never lost a patient in labor. I use ether. If ether is safer in surgery the same holds in obstetrics.

Both ether and chloroform may be given with perfect safety if given in the proper manner.

DR. JONES.—Personally, I use chloroform in almost every case of labor. And further, it seems that my patients usually cry for more and more; they are not satisfied with partial anesthesia. I use the drug freely and yet I have never seen any bad results from it when used during labor.

Dr. Howell in closing said: We all know the effects of morphia soon wear off. Are we to continue administering a hypodermic of morphia every two hours? We all know its effects on the child. We frequently see in the reports of cities a number of still-born children recorded. I believe it may largely be due to the use of morphia.

I recall a case of labor I attended some years ago, in which I kept the patient under the effect of chloroform several hours without any ill effects.

ALCOHOLISM.

BY DR. JOSEPH GOLDBERGER, WILKES-BARRE, PA.

READ DECEMBER 21, 1898.

Before proceeding with the subject of my paper permit me to say that I do not propose to treat it exhaustively. I wish merely to present some features of the subject which have interested me and which, I hope, may not be devoid of interest for you.

The paper is based, in the main, on my experience with these cases in the reception room and alcoholic wards of the Bellevue Hospital. In these wards are treated annually not less than 2,000 patients. The cases vary from the neophyte, who is found by a police officer, affectionately embracing a lamp post, to the "old rounder" who comes in hugging the delusion that after this he will never "touch a drop" but who ultimately ends up in the insane asylum, a victim of his habit.

The neophyte presents himself in the morning with a most woe-be-gone expression and a splitting headache. His tongue

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is coated, his appetite is gone and he is nauseated and perhaps vomiting. A cathartic, such as calomel and jalap and a saline followed by aromatic spts. of ammonia or strychnine, to counteract the depression, and a light diet soon bring him around. Where the indulgence has been excessive the patient sinks into a stupor merging into coma, which is at times very profound and a diagnosis difficult. He is aroused with difficulty or not at all except, perhaps, by strong pressure over the supra-orbital nerves. The face is flushed, pupils dilated and even, pulse increased in frequency and, early, is of fair volume; but later, small and feeble. The breathing is apt to be stertorous. There may be considerable or complete relaxion, there being, on comparison, no difference on the two sides. I have not spoken of the breath of the patient. Of course it is alcoholic, but it is well to bear in mind that this may be the result and not the cause of the coma. Thus, a patient may be stricken with apoplexy and some well-meaning bystander forces liquor down his throat to revive him. Then again apoplexy or a fractured skull may occur in an alcoholic, his condition predisposing to both. A diagnosis must sometimes be made from epileptic, diabetic or uremic coma. Such diagnosis is at times exceedingly difficult, but it is made much easier by bearing in mind the possibility of their occurrence, thus guarding against mistakes.

The prognosis is, as a rule, favorable.

In the milder forms very little treatment is necessary. In the severer cases, stomach washing followed by a cathartic which may be given through the tube before its withdrawal, strychnine hypodermically and external heat are all that is required. After recovery the stomach will need looking after. This condition may occur as the result of a drinking bout in one who is not especially addicted to stimulants, or it may occur as the result of a more than ordinary indulgence in a chronic tippler. Another manifestation, which may occur in the latter, is delirium tremens.

After a prolonged spree the patient begins to lose his appetite and eats little or nothing. The craving for liquor is frequently lost and there may even be a disgust for it. He is

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nervous, easily startled, and does not sleep well. Gradually the patient begins to have hallucinations of sight and hearing, more frequently of the former. At first he is aware that these visions are not real. He knows that the things he sees are not there, but he cannot get away from them. They disturb his sleep and soon they become reality. At this stage the condition of the patient is pitiable. He is racked by terrifying visions. Bugs of various kinds are crawling over him, which he is busily engaged in picking off; or perhaps he imagines himself in a den full of rats, which are trying to attack him. His face expresses terror, and he is bathed in perspiration from his exertions in trying to beat off their imaginary onslaughts. It is a popular belief that the patient in this condition commonly "sees snakes," but as a matter of fact this is far from being ordinarily the case. The pulse is increased in frequency and the temperature may be somewhat elevated. On asking the patient to protrude the tongue or hold out his hands, separating the fingers, one may observe the characteristic tremor which gives the delirium its name. After three or four days of this delirium and restlessness the patient, apparently exhausted, drops into a sound sleep, from which he awakens refreshed and rational. This has given rise to the belief that if we can only produce sleep the patient will awake to recovery. But this is a fallacy. The patient in the midst of his delirium is affected but little by hypnotic drugs. Dangerous doses are required to produce sleep, and this has a better effect on the patient's friends and medical attendant than on the sufferer. A shock, such as a fracture, in one who is addicted to the excessive use of spirits may be the immediate cause of an outbreak or delirium tremens.

In the treatment of these cases it should be borne in mind that they are practically starved and that their stomachs are in a state of catarrh. It is important, therefore, to feed them. The food should be in an easily assimilable form, preferably predigested milk in small quantities and at regular intervals. An attendant should be constantly on hand to prevent his hurting himself. Should he become violent, restraint is desirable. In the treatment of the delerium itself no hypnotic

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has escaped trial. I have myself tested the bromides, chloral, trional, sulfonal, amylene hydrate, urethane, paraldehyde, hyoscine, and hyoscyamine, and have come to the conclusion that a combination of one of the bromides and chloral acts best in the largest number of cases. Thirty grains of potassium bromide and fifteen grains of chloral repeated every three or four hours combined with a thirtieth of a grain of strychnine will have a desirable calmative influence. Much more than this will be required to produce sleep. The chart which I pass around is a very interesting one from this standpoint. The patient, a woman, was admitted to the alcoholic ward in the first stage of delirium tremens. She was given the routine hot bath (not noted on the chart) and then a cathartic of calomel and soda followed by Epsom salts. In the course of the subsequent sixteen hours she received in all potassium bromide ℥ ii, chloral gr. 15, and a hypodermic injection of hyoscine gr. 1–100. The night report (in red) states that the patient was quiet but awake. The following day she received potassium bromide gr. xx. every four hours, with strychnine and digitalis, but in spite of this became noisy and delirious in the course of the afternoon, and had to be restrained. The second night she remained, received in all hyoscine gr. 1-50 hypodermically, potassium bromide ℥ 1 and Chloral dr. 1-2. In spite of this she managed to get loose and disturb the ward. So it went on, or rather she went on doing as she pleased in spite of the sedatives she was receiving. Finally on the third night she went to sleep and awoke in the morning nervous and rational, a result, which I do not think was due to the sedatives which she had taken but to the natural tendency of the delirium to exhaust itself. Besides the bromide and chloral I have found both hyoscine and hyoscyamine useful, especially where a rapid influence is desired. I always combine strychnine with these drugs, not only to guard against their depressing influence on the heart, but also for its powerful tonic action on the nervous system.

In cases complicating fracture it is best to at once immobilize the fracture in plaster of paris. I have known such patients to get out of bed in their delirium and but for this precaution

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would have done themselves great injury. In many cases of this class the supply of alcohol may be cut off at once, but in feeble and elderly patients it had better be given in full quantities to prevent, if possible, an outbreak of delirium.

The patient, recovered from his attack of the "horrors," will frequently express a desire to rid himself of the habit and to reform. But let us see what condition we have to deal with. We have a patient depressed physically, mentally and morally; frequently with an unfavorable heredity back of him. He wishes to reform, to give up drinking, and may promise earnestly to do so; but he is unequal to his promises. He is a sick man, and it is this point I wish especially to emphasize. To obtain a cure, and a considerable percentage is permanently curable, isolation, quarantine is necessary. He must be put under the best hygienic surroundings, removed from temptation and his old associates. His mind and body must be agreeably occupied. He must be given plenty of fresh air, baths, massage and tonics; in short, he ought to be put into a sanatorium, where he should remain until cured, probably a year or two. Under such a line of treatment a goodly percentage will again become useful members of society. With an eye to the future, the habitual drunkard ought not to be permitted to marry. The children of inebriate parents should be carefully guarded. Their physical education should be carefully looked after. In prescribing for such the physician should bear in mind their heredity and carefully avoid the class of drugs to which alcohol, cocaine and morphine belong.

I have not spoken of the, from time to time, much vaunted cures for the alcoholic habit such as the Keeley and the more recently exploited Oppenheim cure. They are all worthless. I have a number of times treated Keeley graduates for delirium tremens, and one of the first graduates of that institution, and one to whom it owed a great deal of its notoriety, subsequently died from the effects of a spree.

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PROSTATIC RETENTION.

BY DR. MARIS GIBSON, WILKES-BARRE, PA.
READ DECEMBER 21, 1898.

By this title we mean the retention of urine caused by enlargement of the prostate.

This is a disease of old men, and I suppose that we have all had cases of this trouble in which we have been able to give the suffering patient most surprising relief; and other cases in which we have had to do and think of all the things we ever knew and then send for some one to help us.

These cases occur at the most inopportune time, just as one is ready dressed to go out for an evening; or after one has gone to bed at the end of a long and weary day; and under unfortunate circumstances, far from home, without suitable instruments. I remember a call one warm summer evening several miles from home; by the time I reached the patient a severe thunder storm had come up, and while lightning flashed and the thunder rolled I worked with the patient, with no instrument but the silver catheter of my pocket case, and I succeeded. There was another case in which I was not so successful; not till I had driven away several miles to find more catheters. All I could find were of the ordinary red kind with wires in them; we had none of the soft velvet eye kind; with one of these I had success.

As I said above, this disease or difficulty is caused by some change in size of the prostate. "The prostate is a glandular cordiform body the size of a chestnut situated before the neck of the bladder, behind the symphysis pubis, and surrounding the first part of the urethra. It is usually described as consisting of three lobes, two lateral and one middle, fitted in between them on the under side and lying beneath the neck of the bladder and the immediately adjacent part of the urethra."

This is the definition of Dunglison's Dictionary. Gould says, in addition to the above, "that it measures an inch and a half in its transverse diameter; an inch in its antero posterior, and three-quarters of an inch in thickness, and weighs about

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six drams." Leidy calls it "an enigmatic organ which is probably homologous with the uterus and vagina in the female."

Gray calls it the "prostate gland"; so does Erichsen's Surgery. Agnew says: "Hypertrophy of the prostate is an enlargement referable to an excessive nutrition of its anatomical components altogether independent of inflammatory changes. The change is essentially a senile one, being rarely seen under fifty years of age, and the more remarkable from the fact that at this time of life, when the forces of growth have culminated in all other parts, they should assume inordinate activity in the prostate." Mudd reports a case in a negro of twenty-seven years, but the usual age of those so affected is between fifty and seventy.

And it is not a frequent disease. Thompson's estimate is that one-third of all men past sixty years have some enlargement, and one-eighth have an appreciable enlargement, but one writer says that over eighty per cent. of old men who have enlarged prostate never have any form of retention.

Prostatic retention is to be differentiated chiefly from that of stricture, calculus, tumor, though the enlarged prostate is a tumor; chronic cystitis, atony of the bladder, which may be caused by enlarged prostate; and real paralysis of the bladder which occurs at the same time in other parts of the body.

Symptoms are slowness in starting the stream, lack of force, dribbling, frequent micturitions, especially at night or early morning. Many cases of retention occur without any symptoms of a marked character, especially if the patient has taken cold or has gone a longer time than usual without an opportunity to empty the bladder. Other cases are not seen by the surgeon until partial retention has existed a long time, and changes of a damaging character have occurred in the urethra, the bladder, ureters, and the kidneys; causing a quantity of residual urine, which is filled with mucus and pus and sometimes calculous material.

Retention is caused by different forms of growth of the enlarged prostate, but mostly by the overgrowth of the median lobe. Watson, quoted by White, found the chief obstruction to urination to be median enlargement in nearly ninety per

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cent. of the cases he collected. White says further, "the posterior commissure growing backward into the bladder may become pedicled, forming a true valve. The lateral lobes may project backward about the vesicle neck in the form of multiple tumors which encroach upon the vesical cavity and lift the neck above the level of the base, forming two vesical pouches."

I remember a case several years ago in which the catheter would enter easily into what appeared to be the bladder and a quantity of urine would follow; then by lifting the point and turning it in a peculiar way it would slip into another pouch and much the larger quantity would flow out.

The treatment by medicine is not very successful; the character of the urine may be modified when it is faulty by alkalies, boric acid and antiseptics. The bladder may be much improved by washing with boric acid solution, listerine or mercury bi-chloride when the condition of that viscus calls for it.

But the principal treatment of these cases is with some form of catheter. Sometimes it becomes necessary to commence the use of the catheter, as it were, gradually, when there is cystitis, and partial retention or residual urine. In such a case the catheter may be used at intervals as the case passes on from bad to worse, as it is liable to do, and reaches the stage of complete retention and regular catheter life; other cases begin with full retention and demand the catheter at once. These cases may improve for a time under judicious management, only to lapse into further trouble; but not always, for some cases in which the hypertrophy is not excessive or comparatively favorably placed, seem to recover and get along well without help for a long time; meanwhile some other ailment may cut short the thread of life.

The catheter most suitable is some form of soft one and the largest that can be used is the best. Any instrument that will pass the meatus will enter the bladder in normal conditions, and in case of an abnormal sized meatus it may be enlarged. But the conditions may be such that the ordinary soft instrument will not enter the bladder; the English variety with a

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wire may be used. This is the kind of instrument most often used by old men who catheterize themselves, and when one sees the things that these patients use, it is no wonder that cystitis occurs in these cases; old, rough, unclean catheters with wires that were never prepared for this purpose. And then the way they are used, bored, jabbed, twisted, forced into the bladder, so that we might expect that the prostate would be full of holes, and the patient die of sepsis.

When the soft catheter cannot be used it may be made more rigid with the Otis sound, or we may use silk or linen instruments or the Mercier, with one or two elbows, or a silver instrument with a bold curve or an elbow, or the Squire catheter which is made up of a series of close fitting segments held together by a chain so arranged that it will take any direction a tortuous canal may lead it, or the Gross instrument made on a similar principle, or the Trendelenberg catheter sound, which has the eye closed by a stylet when introduced. This is useful when there is hemorrhage at the neck of the bladder, which often occurs. But cases arise where no catheter will avail. Then the aspirator may be used, or the bladder may be punctured with a trocar, either through the rectum or in the supra pubic region. It sometimes happens that none of these things will empty the bladder, that the catheter will enter but no urine pass, that nothing can be drawn into the aspirator but a long stringy clot of blood filling the needle and tube; then there is nothing to be done but to make an opening into the bladder and drain it in that way. This may be done in either the prostatic or supra pubic region. Probably in nearly every case the supra pubic operation is the most satisfactory.

None of this work is curative of this condition. It is only to relieve present necessity, and while some one or the other of the means suggested may be depended on for that, it will only tide the patient over the present need.

The cure of these cases, the permanent reduction of the hypertrophied prostate, is a question that has been given much thought by surgeons, and much has been written about it. Dr. Bransford Lewis, in a paper read before the St. Louis Medical Society and published in the *Philadelphia Medical Journal*,

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Vol. II, page 1252, says: "To enumerate the various modes invoked for that purpose would in itself require some time. They have embraced pretty completely the armament of therapeutical alteratives; they have drawn upon the various devices for applying electricity; general and local faradism, galvanism and electrolysis having all had their turn, and surgery has not been spared either in extent or variety of its application, and what has been the net result?" Dr. Morton of the Long Island College Hospital says, in *Medical Record*, Vol. 54, p. 397: "Of all the conditions requiring surgical interference which the genito-urinary surgeon is called on to treat, senile hypertrophy of the prostate, which either entirely or partially prevents the emptying of the bladder, is the most perplexing. Unlike most of the surgical procedures of to-day, in which the indications for operation are laid down with almost mathematical precision, the operations selected for the relief of the conditions due to an enlarged prostate, depend more upon the individual performance or operative habit of the surgeon than upon any rules which are definitely outlined and generally accepted." Several operations are used for this condition, but they are all of a character that would lead one to consider long before he would advise an old man to submit to any of them. It is risky to give an anesthetic to such persons as are usually found with this trouble, and the shock of an operation is not usually well borne; and some of the operations are decidedly formidable for even a well man to consider. So I think it is the general custom to advise these patients to get along with the catheter as long as that can be done with any reasonable comfort, and only resort to any operative procedure when something worse is threatened. The operation of prostatectomy, which may be done either by the supra-pubic or perineal route, though usually by the supra-pubic, is done as follows: After opening the bladder and incising the mucous membrane investing the prostate, that is wholly or partly torn away. But it is a bloody operation and leaves a wound that may readily become septic. White gives a mortality record of $16\frac{8}{10}$ per cent., and Belfield, quoted by White, reports 133 prostatectomies with less than 25 per cent of cures. Of cas-

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tration White says: "It is established as the safest and most radical curative operation yet proposed." But Morton says it carries with it a mortality of 7 to 8 per cent. in selected cases.

Vasectomy, which is done by ligating the vas deferens in the scrotum in two places, an inch apart, and cutting out the pieces between the ligatures, has been proposed and practised to some extent as a substitute for castration. A. C. Wood's 49 cases show a mortality of 12 per cent.

Bottini's operation of burning a channel through the enlarged prostate with a galvano cautery was introduced by Bottini of Pavia, Italy, more than twenty years ago. His first operation was to burn with a red-hot iron the entire prostatic urethra, and charring deeply the substance of the prostate. With his later instrument he cuts through the obstructing bar at the neck of the bladder. His instrument has been modified somewhat by Freudenberg of Berlin, but the principle is the same.

"The instrument is shaped like a lithotrite and is provided with a thin platino-iridium blade, which is concealed when the instrument is closed, but is moved backward in a slot by working a wheel at the end of the instrument. This blade is heated to a dull cherry red by means of the electric current, conducted to it through a cord attached to the end of the instrument. All parts of the instrument except the blade are kept cool by a stream of ice water which constantly circulates through it." After all preparations are made a few drops of a four per cent. solution of cocaine are instilled into the prostatic urethra, the instrument is introduced as a lithotrite is, turned into the position desired and hooked against the prostate, the current is then turned on, and as the screw is turned the blade burns its way down through the prostate. It may be turned in different positions either to back, front or to both sides. Bottini has operated in over 80 cases, with 2 deaths; cures 82.5 per cent. Freudenburg, 34 cases, 2 deaths. All the other cases were much improved. Simon at Heidelburgh reports 8 cases in 1897; 2 died, 4 were cured, 1 benefited, 1 failure. Morton of New York reported 5 cases with no deaths, and Lewis of St. Louis 3 cases. These writers speak in very confident terms of the operation. It is done without an anes-

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thetic, cocaine only being used. Some of the cases were operated on in the office and were not placed in a bed at all; some were operated on the second and third time. The account of the Bottini operation is taken from the papers of Drs. Morton and Lewis previously referred to.

The case which was the inspiration of this rambling paper, that perhaps had better never have been, is as follows:

P. H. S., male (white), no specific history, of this city, seventy-three years old. He had urinary trouble soon after his fifty-fifth year; in his fifty-eighth year the catheter was first used by a physician, and at intervals after that for about five years. At that time he had a large abscess of the scrotum, following a swelling that had existed for a long time. He was then treated by Dr. Murphy. He had to use the catheter to void his urine all through this and ever after, and such catheters as he used, and such ways as he used them, it is a wonder he did not die. While the urethra and lining of the bladder are sometimes especially sensitive to disease germs, at others they are long suffering tissues. I had treated him at intervals, and once removed a catheter that had slipped from his grasp and which he could not reach. Through last September he had been exposed more than usual, travelled about some, and had irregular meals. On the night of October 3d, I saw him. He could not introduce the catheter, and I could not introduce it that night. The next morning some urine was drawn, but after that, though the catheter would enter the bladder, no urine would pass. Dr. Guthrie saw the case at this time, and after repeated trials with different catheters and the aspirator, no urine would pass, though the bladder was full. It was decided then to open the bladder, and empty it in that way. The same evening the operation of supra pubic cystotomy was done by Dr. Guthrie, Dr. Goldberger giving the anesthetic. The bladder was found filled with blood clots and bloody urine, these were turned out, the bladder well washed out with antiseptics, a double drainage tube inserted and the wound closed.

He has had a long convalescence; soon after the operation the catheter would pass by the urethra; there was an abscess of the prostate, and the abdominal wound was very slow in closing, and even yet a few drops of urine pass through it, though the opening is very small. He can pass no urine except with the catheter, but there is no trouble in using it, and he attends to that for himself. His health is good and he is entirely comfortable.

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CASES REPORTED BY DR. G. W. GUTHRIE.

DECEMBER 21, 1898.

I present to-night three specimens—each of which is rather unique in its way:

CASE I. Silk worm gut sutures and phosphatic materials removed from a bladder.

The society will remember that at a meeting held in December, 1895, one of the members reported an operation for supra pubic lithotomy, in which he used silk worm gut to close the bladder, which procedure was criticized in the discussion following.

The operation was done in October, 1895; the healing was very prolonged, and probably a year after the patient was conscious of recurring trouble. Finally in May, 1897, he passed per urethram two sutures which are shown in box marked number I.

Still having trouble he applied for admission to the Wilkes-Barre City Hospital, and on September 23, 1897, I removed by means of Bigelow's Litholapaxy the materials and sutures in box number II, consisting of three sutures and about sixty grains of calculous material.

Patient was relieved for a time, but some months after returning to his home, other stitches had evidently dropped into his bladder and the trouble again appeared. By filling his bladder with water, straining hard and using his finger in the rectum, he passed two stitches one on January 31, 1898, the other on February 3, 1898, both well encrusted; these are shown in box number III.

Still having trouble he came to the hospital again on February 15, 1898, and the next day I repeated the Bigelow operation and removed two more sutures and about a half drachm of stone, since which time he has had no trouble. This specimen the patient took home with him and has not returned it.

It thus appears that nine silk worm gut sutures found their way into his bladder and were removed by way of the urethra. The advantage of this method of operation is shown by the fact that during the first operation patient was but seven days in the hospital, and during the second, only six days.

CASE II. Mass including eighteen inches of the descending colon and a carcinomatous growth.

The following is the history as far as could be obtained:

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M. K.—Was admitted to the hospital on March 21, 1898. Aet. 56. Born in Austria; occupation, slate picker. As he could not speak English very little of his personal history could be learned. Parents both dead; cause not given. Patient always accustomed to hard work, a farmer in the old country; since coming to this country has worked around the mines. Always healthy until present trouble began. Nine weeks ago first had sharp pains in abdomen after eating, since then has become weaker, pain constant, bowels obstinately constipated. Present condition very bad; weak and cachectic. To the left of the umbilicus a well-defined tumor was recognized, about the size of a large orange; hard, deeply placed, did not pulsate. Abdominal wall not adherent; tumor was not fixed nor very sensitive to pressure.

March 22 I opened the abdomen directly over the mass, which was found to involve the descending colon. The affected portion was drawn out of the incision and a gauze ligature applied to the intestine below, and the gut severed. One section of a large Murphy button was introduced. The mesocolic attachments were ligated and cut through from below upward until an unaffected portion of the intestine was reached. Here the gauze ligature was again applied and the mass removed. The other section of the Murphy button was then introduced and the button closed. The rent in the mesocolon was closed a completely as possible, a search made for enlarged mesenteric glands and only one found; a rubber drain inserted and the abdomen closed by a single layer of silk worm gut sutures.

Patient had some rise of temperature after the operation which soon dropped to normal and remained so. On the third day the bowels began to move involuntarily and acted three or four times in twenty-four hours. In a short time control was regained and there was no subsequent trouble in this respect. The movements were generally liquid, dark colored and contained mucus.

About a week after the operation a fecal fistula appeared at the upper angle of the wound in the old track of the drainage tube and discharged freely. By degrees it closed and disappeared in three weeks.

Patient's general condition became gradually much better; gained in flesh, color improved, appetite good, bowels regular without laxatives, no pain in abdomen nor tenderness and external wound entirely healed. This was his condition on May 6, 1898, at the time of his discharge from the hospital.

The Murphy button was not discharged until June 18.

He was seen at his home June 26, by Dr. W. R. McAdam,

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resident physician. His condition was not good; bowels did not move without laxatives, pain and tenderness had reappeared in abdomen, and there was evidence of recurring trouble. Hardened glands in the abdomen and inguinal region and a nodule in the lower angle of the cicatrix.

He was next seen in my office July 7, at which time the appearances last noted were present to an increased degree and the skin and conjunctivae were markedly yellow. There was also great pain in the region of the liver, leaving no doubt that this organ had also become involved in the cancerous process.

About the 15th of August the newspapers announced that this man had ripped open his abdomen with a razor for the purpose of removing a cancer. Death resulted.

The tumor was ten and one-half inches in circumference in one direction and twelve in another, and weighed fifteen ounces. The growth originated in the glands of the mesocolon. The portion of the gut involved formed an outline like a flattened letter S. At one point the lumen of the gut was nearly obliterated. Here the parallel sides of two sections of gut became agglutinated by inflammatory adhesions and a natural anastomosis made, the contents of the bowel passing through, side tracking a loop of intestine ten and one-fourth inches long.

The pathological report shows the tumor to be adeno-carcinoma.

Case III. Dermoid cyst of ovary, complicating a pregnancy at third month. Operation; recovery without abortion.

Mrs. A. P., Aet., 20. Born in Poland; in America eight years. One year married, no children. No menstruation for last two months. Suffering from nausea and vomiting; throws up everything morning, noon and night. Bowels more regular when she eats anything.

Examination reveals a tumor to right of uterus as large as a goose egg. Uterus is enlarged, but normal in position. Probably the second or third month of pregnancy.

Patient was admitted to the hospital on December 10, 1898. I opened the abdomen, found the uterus enlarged, probably to the third month of pregnancy, and a tumor of the right ovary which I removed, disturbing the womb as little as possible, and ligating close to the tumor. The patient has made an uneventful recovery, thus far (December 21), no evidence of miscarriage appearing.

The tumor proves to be a dermoid cyst containing caseous

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looking matter, hair, some bone and one tooth, as shown by the specimen.

The case in some respects is similar to one in which I assisted the late Dr. Joseph A. Murphy, over fourteen years ago. In that case the cyst was much larger, the pregnancy three months advanced. His patient made a fine recovery and was safely and easily delivered at full term. A few days ago she brought her boy, born at that time, to my office. She is not troubled with ventral hernia.

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